Bio-CLIMA Nicaragua

"Integrated climate action for reduced deforestation and strengthened resilience and in the Bosawas and Rio San Juan Biosphere Reserves"

Annex 2a

Feasibility Study of the Strategic and Institutional Setting of the Bio-CLIMA Project

Contents

ACRONYMS

AFOLU	Agriculture, forestry and other land use
AGB	Aboveground biomass
AGF	Agroforestry systems
AMASU	Awas Tingni Mayangnina Sauni Umani indigenous territory
ANACC	Nicaraguan Climate Change Alliance
BAU	Business as usual
BCN	Central Bank of Nicaragua
BECO	Ecological Battalion
BGG	Belowground biomass
BICU	Bluefields Indian and Caribbean University
C	Carbon
CADPI	Center for the Autonomy and Development of Indigenous Peoples
CANICARE	Nicaraguan Chamber of Meat Exporters
CANISLAC	Nicaraguan Dairy Sector Chamber
CCF-A	Forest and Environment Consultative Committee
CEDAW	Convention on the Elimination of all Forms of Discrimination Against Women
CITES	Convention on International Trade in Endangered Species
CNU	National University Council
CO_2	Carbon dioxide
$C0_{2eq}$	Carbon dioxide equivalent
CODEFOR	Departmental Forestry Commission
COMUFOR	Municipal Forestry Commission
CONADETI	National Commission of Demarcation and Titling
CONAFOR	National Forestry Commission
CONAGAN	National Livestock Commission of Nicaragua
CONFOR	National Commission of Reforesters
COP	Committee of Parties

DFI	Direct foreign investment
d.m	Dry matter
EF	Emissions factor
EIE	Environmental Impact Evaluation
ENDE-REDD+	National REDD+ Strategy
ER	Emission reductions
ERPA	Emissions Reduction Payment Agreement
ERPD	Emissions Reduction Program Document
ER-PIN	Emission Reductions Program Idea Note
ESMF	Environmental and Social Management Framework
EU	European Union
FAO	Food and Agriculture Organization of the United Nations
FCPF	Forest Carbon Partnership Facility
FGRM	Feedback and Grievance Redress Mechanism
FONADEFO	National Fund for Forest Development
FRL	Forest Reference Level
FUNDENIC	Nicaraguan Foundation for Sustainable Development
GDP	Gross Domestic Product
GEF	Global Environment Facility
GFOI	Global Forest Observations Initiative
GHG	Greenhouse gas
GIS	Geographic Information System
GIZ	German International Development Agency
GRACC	Autonomous Regional Government of the Caribbean Coast
GRACCN	Autonomous Regional Government of the North Caribbean Coast
GRACCS	Autonomous Regional Government of the South Caribbean Coast
ha	Hectare
IADB	Inter-American Development Bank

IED	Direct foreign investment
IFAD	International Fund for Agricultural Development
INAFOR	National Forestry Institute
INATEC	National Technological Institute
INETER	Nicaraguan Institute of Territorial Studies
INGEI	National Inventory of Greenhouse Gases
INIDE	National Institute of Development Information
INPESCA	Nicaraguan Institute of Fisheries and Aquaculture
INTA	Nicaraguan Institute of Agricultural and Livestock Technology
IPCC	International Panel on Climate Change
IPSA	Agricultural and Livestock Protection and Sanitation Institute
IT	Indigenous territory
ITG	Indigenous territorial government
IUCN	International Union for the Conservation of Nature
LULUCF	Land use, land use change, and forestry
M	Million
MAG	Ministry of Agriculture and Livestock
MARENA	Ministry of the Environment and Natural Resources
MEFCCA	Ministry of Family, Community, Cooperative, and Associative Economy
MHCP	Ministry of Hacienda and Public Credit
MRV	Measurement, Verification (Monitoring), and Reporting
Mt	Million tons
MTR	Mid-term review
NB	Non-forest
NGO	Non-governmental organization
NICADAPTA	Adaptation to climate change and market changes project
NMRVS	National Monitoring, Reporting, and Validation System
OP	Operational policies

PA	Protected area
PAIPSAN	Support Project for the Increase of Productivity, Food and Nutrition Security in the Nicaraguan Caribbean Coast
PAMCC	Policy of Climate Change Adaptation and Mitigation
PES	Payments for environmental services
PIU	Program Implementation Unit
PNDH	National Human Development Plan
PNF	National Forestry Program
PP	Private property
PPP	Public-private partnerships
PROCACAO	Project for the improvement of organizational and productive capacities of cocoa producers in the Mining Triangle.
PRONicaribe	Regional office of PRONicaragua on the Caribbean Coast
RACCN	Autonomous Region of the North Caribbean Coast
RACCS	Autonomous Region of the South North Caribbean Coast
RAMSAR	Convention on Wetlands
REDD+	Reduction of emissions from deforestation and forest degradation
REL	Reference emission level
R-PIN	Readiness Program Idea Note
R-PP	Readiness Program Proposal
RRNN	Natural resources
SDC	Swiss Development Cooperation
SDCC	Secretary for Development of the Caribbean Coast
SEPLAN	Secretary of Planning
SEPROD	Secretary of Production
SERENA	Secretary of Natural Resources and the Environment
SESA	Strategic Environmental and Social Assessment
SICOR	Regional Cooperation Information System
SIGA	Environmental Management Information System

SIGC	Knowledge Management Information System
SIMEAR	Information, Monitoring, and Environmental Education Systems
SINAP	National System of Protected Areas
SINAPRED	National System for Disaster Prevention
SINIA	National System of Environmental Information
SIS	Safeguard Information System
SNMRV	National Monitoring, Reporting, and Validation System
SPPP	Secretary to the Presidency for Public Policies
t	Ton
TA	Technical assistance
UCA	Central American University
UNA	National Autonomous University
UNFCCC	United Nations Framework Convention on Climate Change
UNI	National Engineering University
URACCAN	University of the Autonomous Regions of the **Nicaraguan** Caribbean Coast
WB	World Bank

1 Strategic context and baseline situation

1.1 Socio-economic profile

Nicaragua is the second poorest country in the Western Hemisphere, with most poor and extreme poor people living in the Caribbean Region (CR), which constitutes more than half of the national territory and contains approximately 89% of the countries forests (3.19 M ha). It is inhabited by only 15% of national population (12.7 inhabitants/km^2) most (67%) in rural areas. The main economic activities in the CR are subsistence agriculture, livestock, coffee, cocoa, palm oil, bamboo, fishing (including shrimp and lobster), logging, tourism and mining[1]. The CR is home of most indigenous and afro-descendant people that control 71% of closed broadleaved forests, nevertheless, the deforestation rate in the CR has been very high: Between the years 2000 and 2015 Nicaragua lost 147,202 ha of tropical forests every year - equivalent to 15.65 M t CO_{2eq}./year, at a rate of 2.3%, mainly in the CR[2]. Most of these areas have been converted into pastureland, crops or to secondary vegetation "*tacotales"*, which increased in area 30% and 53% respectively during that decade.

Favorable market conditions created by free trade agreements with Central American countries, Venezuela, and the US have stimulated livestock expansion. Between the years 2000 - 2009, the national livestock sector grew at a 5% annual rate, and between 2006 and 2015 the export value of livestock products increased by 176%[3]. Presently, beef and dairy products are among the top four exports in terms of value. In 2015, Nicaragua exported over 222,000 metric tons of livestock and dairy products, valued at nearly US$700 million, which represents almost 10% of GNP and contributes more than 25% of the total value of exports.

Administratively the CR is divided into the North (RACCN) and South (RACCS) Autonomous Regions, and the *Departamento Río San Juan*. The RACCN contains the BOSAWÁS Biosphere Reserve[4] in its Northwest, while the Río San Juan Biosphere[5] stretches from the Southeast of the RACCS into the *Departamento Río San Juan*. Within these protected areas, forest cover diminished by 2.7% between years 2010 and 2015[6], demanding urgent action and substantial investment to protect them. Deforestation in the municipalities located within the buffer zones of both Biosphere Reserves continues to be alarming, as shown by the recent forest cover change assessment for the period 2015 and 2018 carried out by MARENA[7].

The population of the CR was estimated at 1.1 million inhabitants (2013) with most people living at the coast. The CR has the lowest human development index in Nicaragua (0.50-0.55). The population is multi-ethnic, including Miskito, Rama, Mayagna and Ulwa (indigenous), Garifuna and Creole afro descendent) people. In the RACCN the population is predominantly Miskitu (72%) and Mestizo (22%), while in the RACCS most people is Mestizo (81%) and Creole (8.5%)[8]. Bio-CLIMA will strive to support indigenous people within both Biosphere Reserves.

1.2 Land use and land use change

In 2015, standing forests covered 2.05 million ha in the RACCN and 1.13 million ha in the RACCS and are mostly broad-leafed and found in indigenous and afrodescendant (I&A) territories (Table. 1). Current forest cover has been reduced by half from historical levels as the agricultural frontier has advanced in an eastward direction from central Nicaragua towards the Caribbean coast.

The main source of GHG emissions of Nicaragua is Land Use and Land Use Change. Between the years 2005 and 2015 annual mean emissions from deforestation were 15.65 M t CO_{2eq}, while emissions for forest degradation were 3.6 M t CO_{2eq} every year[9].

1.2.1 Deforestation[10]

Most of deforestation occurs in the CR between 2005 and 2015 were 90,854 ha/year were lost[11,] equivalent to emissions of 14.17 Mt CO2e/yr. Additionally, anthropic forest degradatation is about 16% of total emissions and contributes on average 2.43 Mt CO2e/yr.

An annual average deforestation rate of 16,667 ha/yr in the BOSAWAS Biosphere Reserve contributed to about 40% of the deforestation in the north and 7,640 ha deforested yearly in the Indio Maíz Biological Reserve contributed to about a quarter of the deforestation in the south. In both Reserves, the majority of the deforestation occurred in buffer zones. In Indio Maiz, the deforestation rate in the buffer zone was about 7,100 ha/yr (a relative annual rate of 5.99%), compared to about 500 ha/yr (a relative rate of 0.17%) in the nucleus of the Reserve. In the case of BOSAWAS, deforestation in the nucleus of the Reserve averaged about 4,671 ha/yr (0.87% annually), but was much greater in the buffer zone, about 11,990 ha/yr (2.88% annually).

Figure. 1 Deforestation 1969-2015

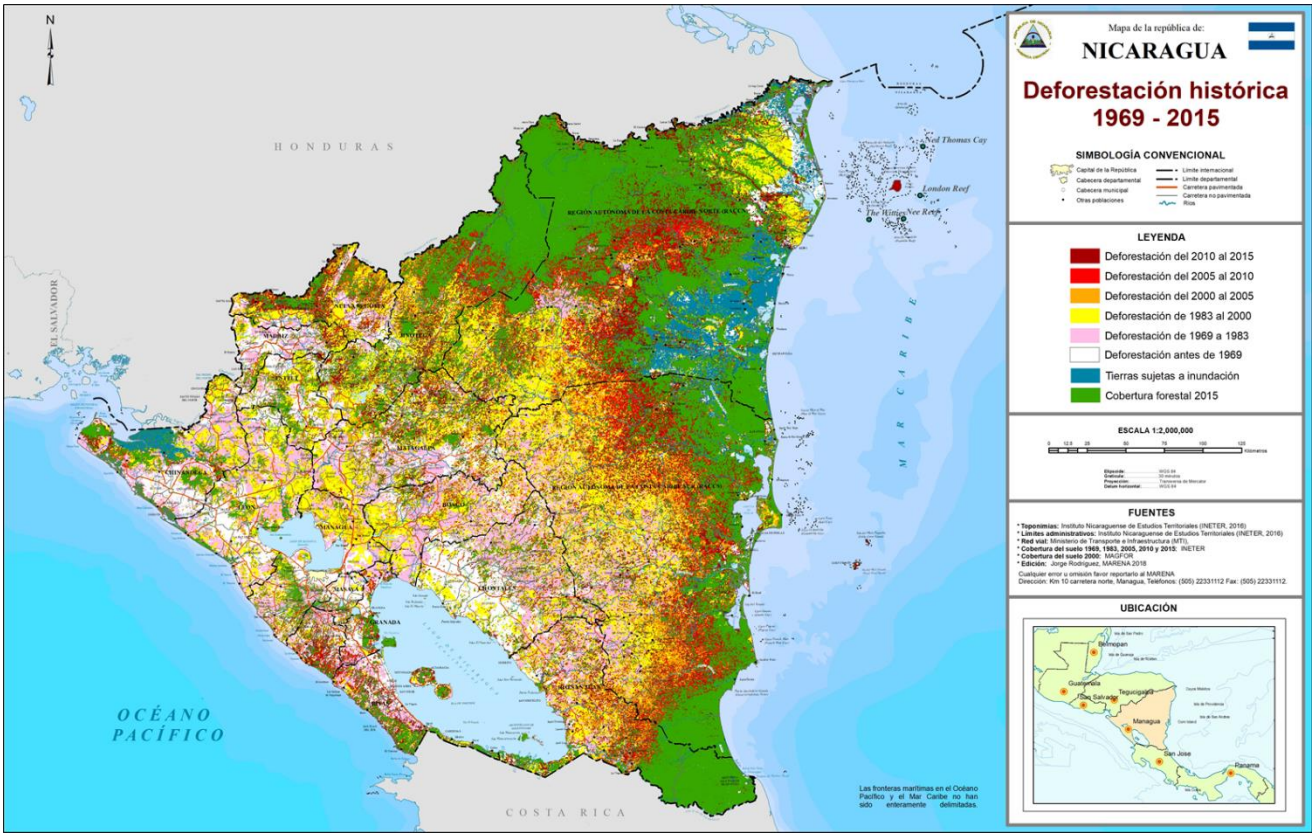


Figure. 2 Loss of forest cover in the Autonomous Regions, 1983 - 2015.

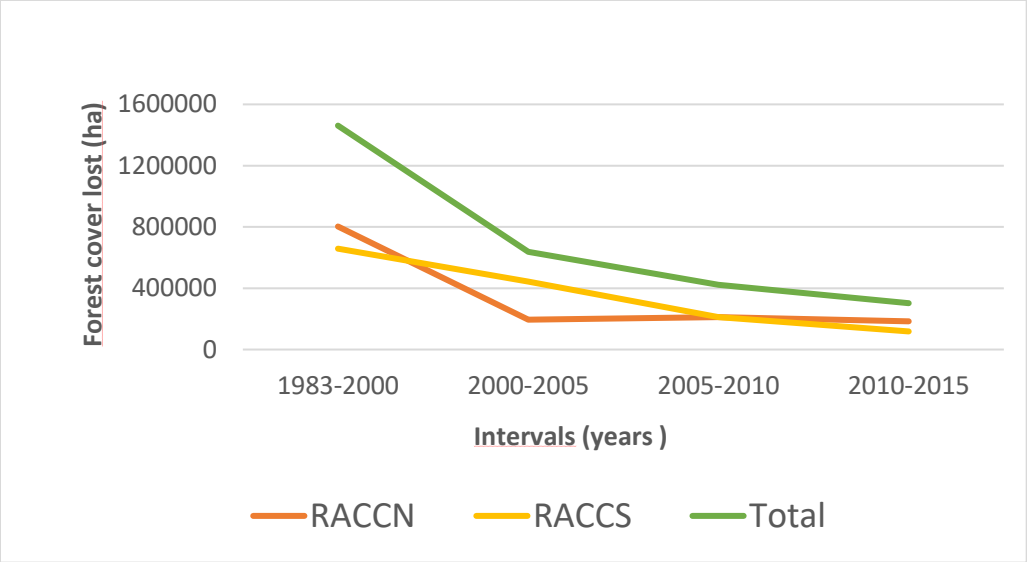


Table. 1 Characteristics of forest cover and loss in the Caribbean Region, 2005 – 2015.

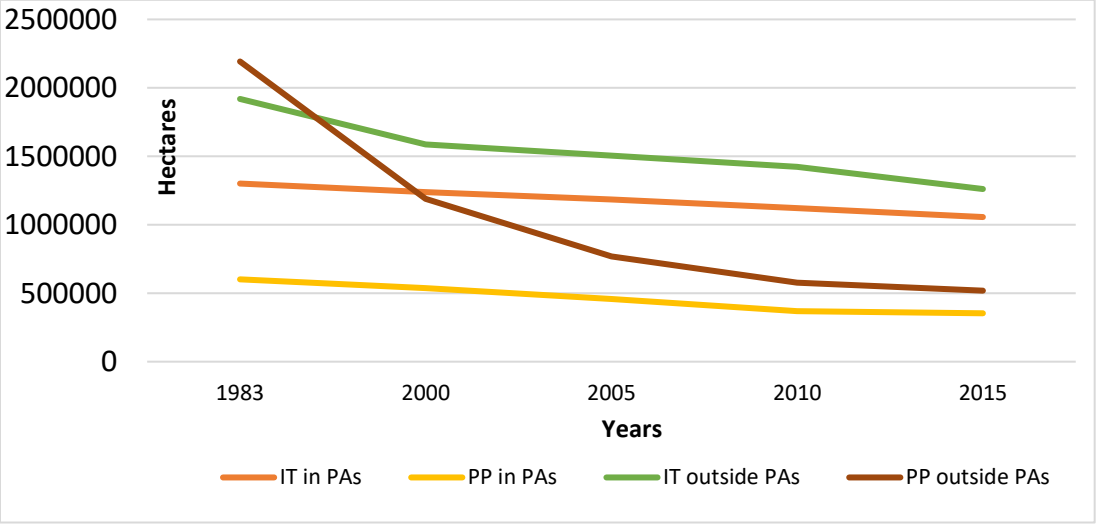
Use	**Forest cover in 2015 (ha)**	**Average annual deforestation rate (%) 2005 - 2015**	**Average annual forest loss (ha/yr) 2005 - 2015[12]**	**Estimated emissions (Mt CO_2e/yr)**
Land tenure				
I&A territories within PAs	1 056 235	1.07	12 729	2.4
I&A territories outside PAs	1 260 892	1.61	24 300	4.5
Private property within PAs	353 304	2.26	10 345	1.9
Private property outside PAs	518 435	3.26	25 126	4.7
Total	**3,188,866**	**2.11**	**72,500**	**13.5**
Forest type (adjusted values)				
Conifers	175,604	0.40	1,547	0.1
Broadleaf	1,989,098	2.29	73,109	13.7
Total	**3,158,868**		**74,656**	**13.8**
Fate of forests lost				

Principal fates of cleared forests (in communal and private property)	**Forest loss, 2005-2015 (ha)**	**Average annual deforestation rate (%) 2005 - 2015**	**Average annual net loss (ha/yr) 2005 - 2015**	**Estimated emissions (Mt CO_2e/yr)**
Pastures	522,133	1.52	52,213	10.8
Annual crops	86,825	0.25	8,682	1.8
Perennial crops	20,847	0.06	2,085	0.4

Most forest loss is associated with broadleaf forests rather than coniferous forests (Table. 1). Forests historically found in private property outside protected areas (PAs) have been more deforested than forests found in indigenous and afro-descendant communal territory (IT) inside and even outside the PAs, or on private property (PP) within the PAs. During 2005 – 2015, annual deforestation rates in private and communal property were similar whether within PAs or outside of PAs, but rates within PAs were about half of those found outside of PAs, presumably due to greater control associated with PAs (Table. 1).

Table. 1 also underscores the importance of indigenous and afro-descendant territories and PAs as forest reservoirs, since they contain about 85% of the forests (2.67 million ha compared to 0.52 million ha found on private property outside of PAs) still found on the Caribbean Coast.

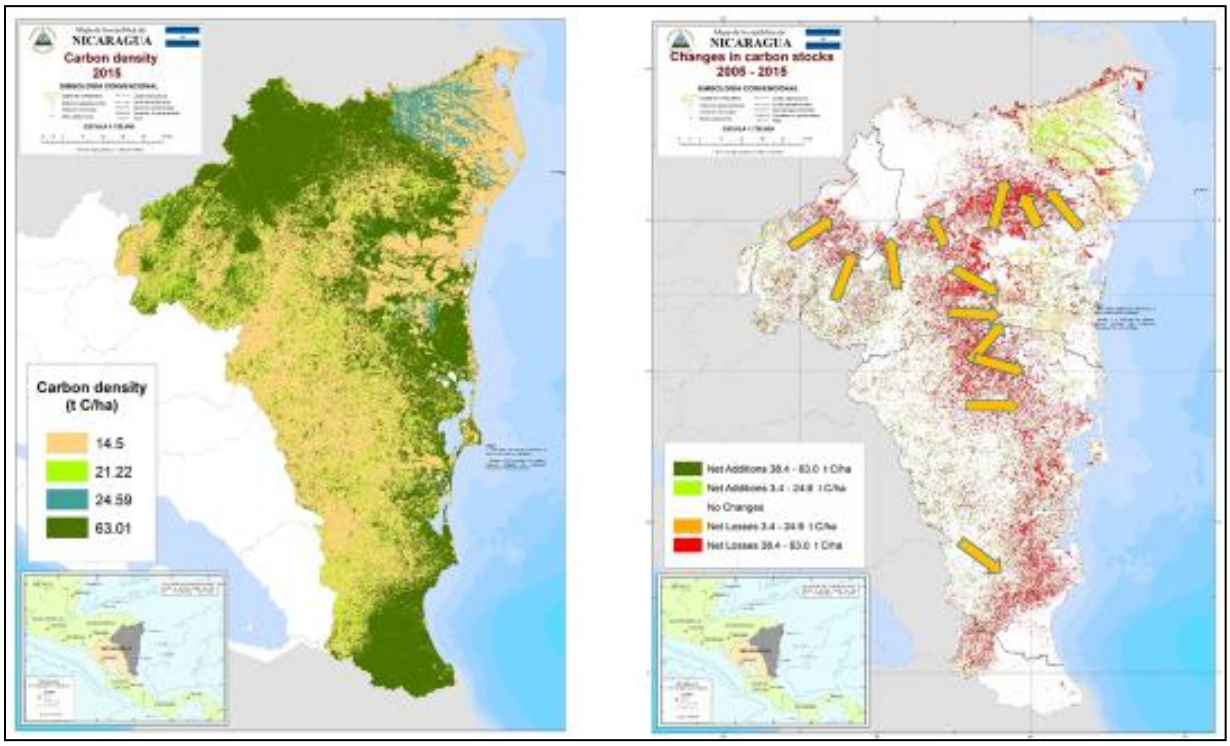
Figure. 3 Forest cover by land tenure category, 1983 al 2015.



At a more local level, recent deforestation is located in 6 areas or fronts where the risk of future carbon loss is high, due to the proximity of recent deforestation to areas of high carbon density with road access (**Error! Reference source not found.**). Consequently, these areas merit greater attention and concern. Four are found in the RACCN and two in the RACCS and are located on the margins of the

territories of indigenous and afro-descendant peoples and PAs. In the RACCS, deforestation is advancing towards the Indio-Maíz Reserve, especially towards the northern and western limits of the Reserve, and between the municipalities of La Cruz de Río Grande and Laguna de Perlas (Wawashan and Karawala). In the RACCN, the south-west (Jinotega) and south-east (Mining Triangle area) boundaries of the BOSAWAS Reserve, the road to Bilwi, and the forest ring in the Prinzapolka sector, are most affected.

Figure 4: Carbon density in 2015 and changes in carbon density 2005-2015 (arrows indicate access routes).



1.2.2 Forest Degradation

Losses of forest biomass associated with forest degradation within 1 km of roads and rivers (assumed to be anthropic degradation) accounts for about 16% (an average of 2.4 Mt C/yr) of total annual emissions (see Section 7 of the ERPD Document).

The principal causes of degradation are firewood harvests, non sustainable legal and illegal logging, and fires. In relation to logging, limited data from INAFOR suggests that the amount of legal timber transported to sawmills in 2013 was 77,000 m^3. Assuming that actual legal extraction levels are four times greater (the Production, Consumption, and Commerce cabinet plans about 278,000 m3 of timber production in 2017-2018[13]) and that illegal logging is similar to legal extraction[14], implies that legal and illegal logging are responsible for the extraction of about 0.6 million m^3 of wood/yr, equivalent to about 0.17 Mt C annually (less than 20% of estimated anthropic degradation).

Historically, firewood and charcoal produced from biomass have been the principal energy sources used in Nicaragua, but in recent years their importance has declined. According to the 2006-2007 National Firewood Survey, average firewood consumption is 1.81 kg/person/day (ENI, 2006-2007). If the

population of the Caribbean Coast is 1,107,342 inhabitants (INIDE, http://www.unfpa.org.ni/wp-ontent/uploads/2013/02/Proyeccion-cPoblacion-Nic-2007.pdf), firewood consumption is estimated to produce about 0.34 Mt C emissions annually. However, it should be noted that 70% of the firewood come from branches, dead wood, or fallows, whereas only 9% (equivalent to 0.03 Mt C) comes from tree felling or pruning associated with forest loss.

The extent of fires is very variable from year to year. The national median value is about 20,000 ha/yr (MARENA, 2016), of which it is estimated that about 20% occurs in the Caribbean region, due to moist conditions in the region, and that fires consume 50% of the biomass. Therefore, fires are estimated to contribute about 0.13 Mt C/yr, which may be an overestimate, due to the difficulty in distinguishing between fires in forests and fires used to clear forest for agriculture (which is deforestation, not degradation).

The sum of these potential contributions to forest degradation only account for about one-to two-thirds of the estimated emissions based on biomass estimations. It is suspected that this difference is due to the sub-estimation of illegal logging. Clearly, more work is needed in order to estimate forest degradation more accurately (see ERPD, Section 8).

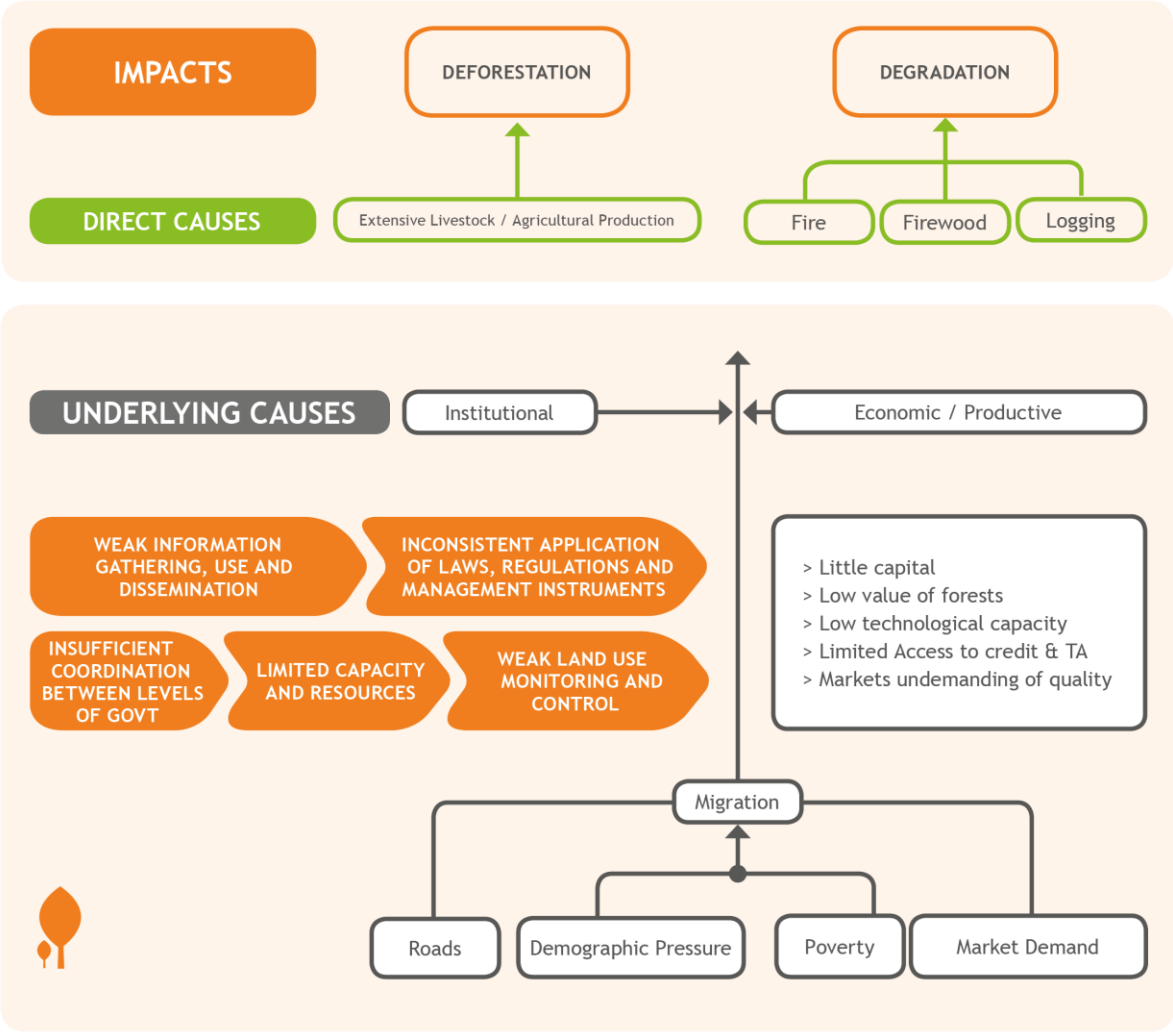
1.2.3 Carbon Enhancement

Increases of carbon stocks are estimated to occur on 16,717 ha/yr, resulting in average removals by new forests of 0.97 Mt CO_2e annually. The large majority of these carbon removals are associated with the transition of fallows (*tacotales)* to new secondary forests.

1.3 Analysis of the drivers and underlying causes of deforestation and forest degradation[15]

The causes of deforestation can be divided into direct and underlying causes, as shown by the problem tree.

Problem tree for deforestation and forest degradation.

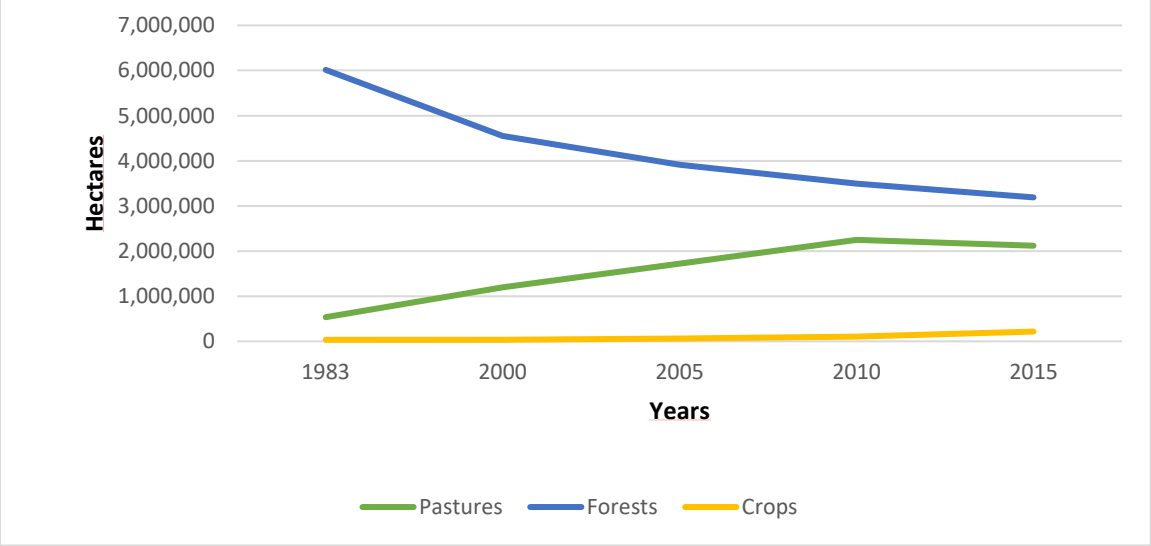


1.3.1 Direct Causes

The main direct cause of deforestation is extensive livestock and agricultural production associated with the expansion of the agricultural frontier. In general, the expansion of extensive livestock and agriculture on the Caribbean coast of Nicaragua mirrors the loss of forest cover between 1983 and 2015, 2.2 million ha of forest were lost while 1.6 million ha of pastures and approximately 200,000 ha of crops were established. However, in the period between 2010 and 2015, this relationship weakened: the total net area of pastures decreased by 147,000 ha, due to the creation of approximately 275,000 ha

of new pastures from forests, but the concomitant conversion of some 420,000 ha of pastures to other uses, mainly secondary vegetation ("tacotales") (about 345,000 ha) and perennial crops (about 35,000 ha). This suggests recent trends toward intensification of livestock raising and/or a shift towards more productive land uses.

Area of pastures, crops and forest in the Caribbean Coast, 1983-2015.



1.3.2 Underlying Causes

Extensive land use associated with the expansion of the agricultural frontier is underlain by various factors including migrations to the Caribbean from the Pacific and North-Central regions of Nicaragua, and within the Caribbean region itself, resulting from demographic pressure stemming from annual population growth of 1.4%, poverty, the availability of relatively cheap land in the Caribbean Coast, and road connections to and within the Caribbean Coast. It has also been promoted by favorable internal and external markets for milk, meat, and perennial crop commodities such as oil palm, cocoa, and coffee (BNC, 2015; TechnoServe, 2017)[16].

In effect, high land prices and decreasing land availability in the Pacific and North-Central regions of Nicaragua, driven by increases in population and high value export-oriented agriculture, provide incentives to poor farmers there to sell their land at relatively high prices and to migrate to the Caribbean coast, where land is cheaper (Polvorosa, 2015). Once there, favorable markets for livestock products provide incentives for the establishment of livestock or mixed agricultural (livestock and crops) operations or land speculation based on pastures.

Within this context, seven public investment projects aimed at road construction or improvement in the Caribbean coast may affect future emissions. These projects are aimed at the construction of all-weather roads in order to connect the Caribbean coast with the country´s principal political and commercial centers and involve the i) Laguna de Perlas, ii) Kukrahill, iii) Siuna, iv) Mulukuku, v) El Cua, vi) Bluefields, vii) Rosita, and viii) Nueva Guinea municipalities. Greater inter-institutional coordination and

the avoidance, mitigation, or compensation of environmental impacts of roads will be needed in order to potentiate the economic impact of these projects while minimizing those on forests.

Within the Caribbean, deforestation driven by these macro socio-economic factors is the result of a) the low value or opportunity cost of forests, stemming from inefficient forest production systems, the low profitability of forest products, and the lack of national or international markets for forest ecosystem services, which provide incentives for forest conversion to other, more economically profitable uses; b) underlying economic/productive conditions that encourage extensive land use and create a comparative advantage for Nicaraguan farmers who produce low cost meat, milk, and other crops based on deforestation; c) limited institutional capacity to monitor and control land and forest use, which is necessary to prevent forest degradation or the conversion of forests to agriculture in the face of land use pressure; and d) limited employment opportunities off-farm that could absorb marginal farmers and reduce the pressure on forests.

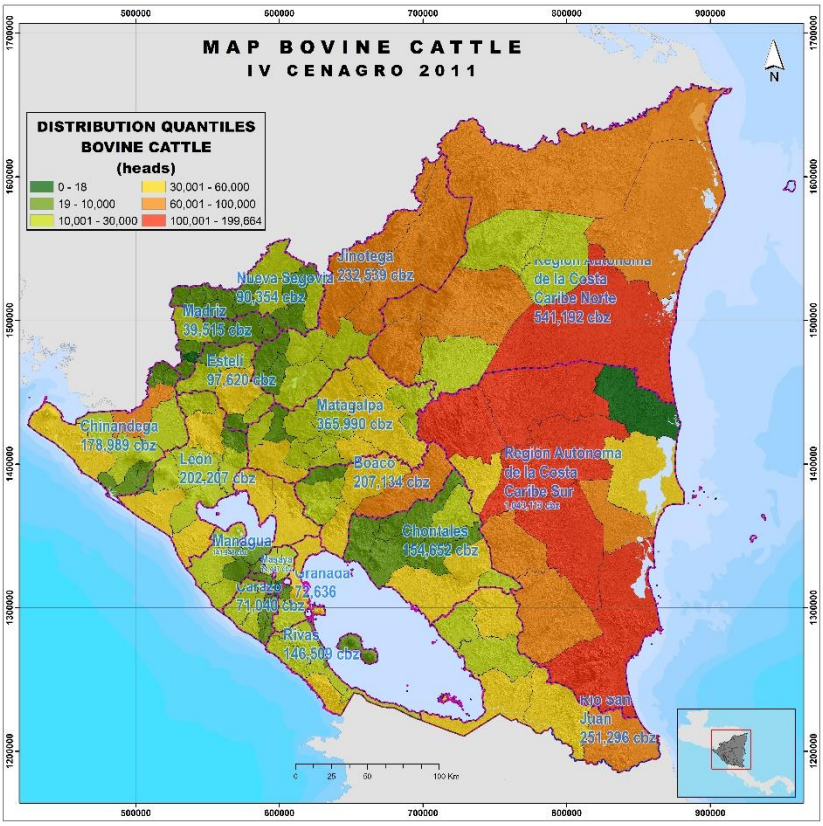
These factors interact to cause deforestation and forest degradation. How these factor play out in the context of livestock and crops is further explained below.

Extensive Pasture and Livestock Management

During recent decades, the Caribbean coast has become the most important livestock producing region in the country. In 2010, the livestock sector in the project area at that time accounted for about a quarter of the livestock producers, 30% of the livestock farms, and 40-50% of the total pasture area, as well as livestock populations, at the national level (CENAGRO, 2011). At present, these proportions may be even higher, since livestock production has shifted towards the Caribbean coast in recent years due to favorable growing conditions year-round for pastures and the availability of relatively cheap land (CONAGAN, personal communication; survey of BCN, 2015).

The RACCS has more than twice the pasture area and head of cattle and about 50% more livestock farms than the RACCN (CENAGRO, 2011). Average farm size in the RACCS is 60 ha compared to 35 ha in the RACCN. In general, the greatest proportion (21%) of livestock are found on farms 35 – 70 ha in size; only 7% of the farms are larger than 70 ha in size, but the latter account for 62% of the pasture land and half of the cattle population.

Bovine herd map (# of head).



Characterization of the livestock sector in the Caribbean Region of Nicaragua (CENAGRO, 2011).

Departament/Region	# of Farms	# Farms with Cattle	# Head	# Head/Farm	% of Total Herd Size
Alto Wangki (Jinotega and Nueva Segovia)	16256	7578	126721	16.72	7.22%
RACCN	20541	13740	466263	33.93	26.55%
RACCS	22704	19183	1128028	58.80	64.23%
Río San Juan	2233	1719	35268	20.52	2.01%
Total	**61734**	**42220**	**1756280**	**41.60**	**100.00%**

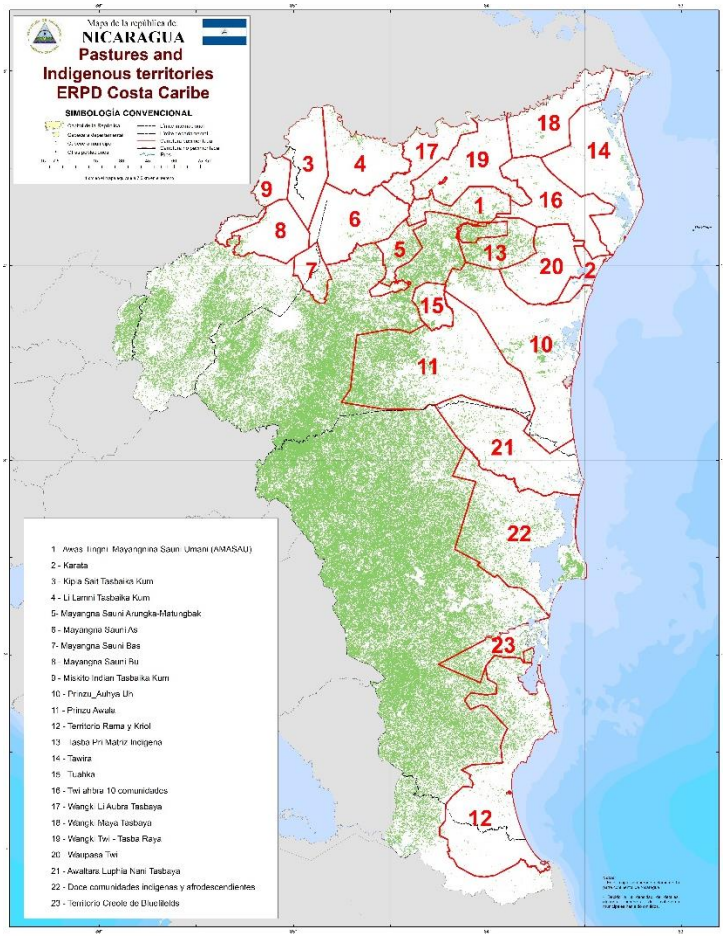
In 2010, the RACCS had about 1.1 million head of cattle, located principally in the municipality of Paiwas (23% of the herd), followed by the municipalities of El Rama (19%), Nueva Guinea (18%), and Muelle Los Bueyes (13%) (**Error! Reference source not found.**) The RACCN had about 460,000 head of cattle distributed mainly in the municipality of Prinzapolka (30%), 15% in each of the Puerto Cabezas, Waslala

and Waspan municipalities and 13% in Siuna. In the zone of Bosawas, the municipality of San José de Bocay had 94,763 head, Wiwilí of Jinotega 63,536 head, and El Cuá had 22,436 head. Finally, in the zone of the Indio-Maíz Reserve, there were 47,239 head of cattle in the municipality of El Castillo and 91,537 head in de San Juan de Nicaragua municipality (CENAGRO, 2011).

Most of the pastures (1,734,636 ha or 82% of the total) are found on private properties and are managed mainly by individual mestizo producers. In contrast, the area of pastures in the territories of indigenous and afro-descendant peoples (see polygons numbered in **Error! Reference source not found.**) is much smaller (365,739 ha of pasture equivalent to 18% of the total pasture area). These pastures are mainly found near colonized areas (e.g. the Mining Triangle and polygons #1, 6, 8, and 16).

There is evidence that suggests that pastures are associated with the advancement of the agricultural frontier in some indigenous and afrodescendant territories, in some cases contributing to tensions between community groups and settlers from the outside. In some communal lands, the establishment or use of pastures by members from outside the community has been allowed in order to obtain land rents, but indigenous peoples themselves also establish pastures in response to the growing demographic and economic pressure. In other cases, outsiders have settled in indigenous territories without the consent of the communal owners.

Pastures (green) in the Caribbean Region of Nicaragua, 2015. Numbered polygons represent indigenous and Afrodescendant territories.



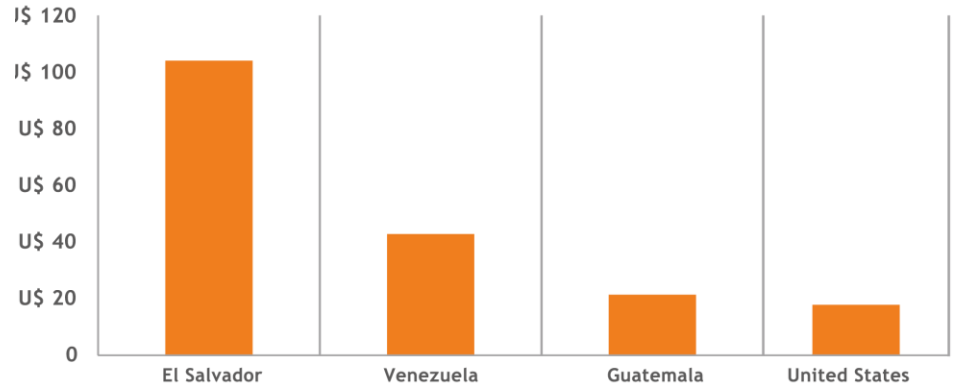
Favorable market conditions created by free trade agreements with Central American countries, Venezuela, and the US have stimulated livestock expansion. Between 2000 - 2009, the national livestock sector grew at a 5% annual rate, and between 2006 and 2015 the export value of livestock products increased 176% (TechnoServe, 2017). Presently, beef and dairy products are among the top four exports in terms of value. In 2015, Nicaragua exported over 222,000 metric tons of livestock and dairy products, valued at nearly US$700 million, which represents almost 10% of GNP and contributes more than 25% of the total value of exports.

The value of livestock exports is contributed mainly by beef, 76% of which is exported. Dairy products contribute about 30% to livestock sector exports (principally to Central America, especially El Salvador), but it should be noted that most (85%)[17] milk is consumed domestically, since milk and cheese comprise 27% of the shopping basket of Nicaraguan families.

NICARAGUA'S LIVESTOCK EXPORTS

KEY FACTS AND FIGURES

Importers of Nicaraguan Dairy Products • (U$ Million USD, 2006 - 2015)



Value of Livestock and Dairy Exports

(U$ Million USD, 2006 - 2015)

	2006	2015	Crecimiento
Ganadería	U$ 190.6	U$ 494.3	159%
Leche y productos lácteos	U$ 62.5	U$ 203.5	226%
Total	U$ 253.1	U$ 697.8	176%

The majority of livestock production occurs via double purpose systems (beef and milk production). Small producers tend to favor milk production which accounts for about 55% of their livestock-related income. The importance of beef as a source of income increases with farm size to a maximum contribution of about 60% of total income.

Livestock production gives rise to three parallel value chains, one based on beef and two based on milk (TechnoServe, 2017):

Informal Dairy Value Chain: The highly competitive market for locally processed cheeses comprises about 75% of Nicaragua's total dairy market and has low profit margins and low quality standards. In

this chain, small farmers either process the milk they produce directly on farm or sell it to small-scale local processors, who mainly produce simple, un-aged cheeses. This is a risk management strategy (rather than a value adding activity) because producing cheese preserves unrefrigerated milk. The final product is consumed locally and about half is exported by intermediaries to other Central American countries.

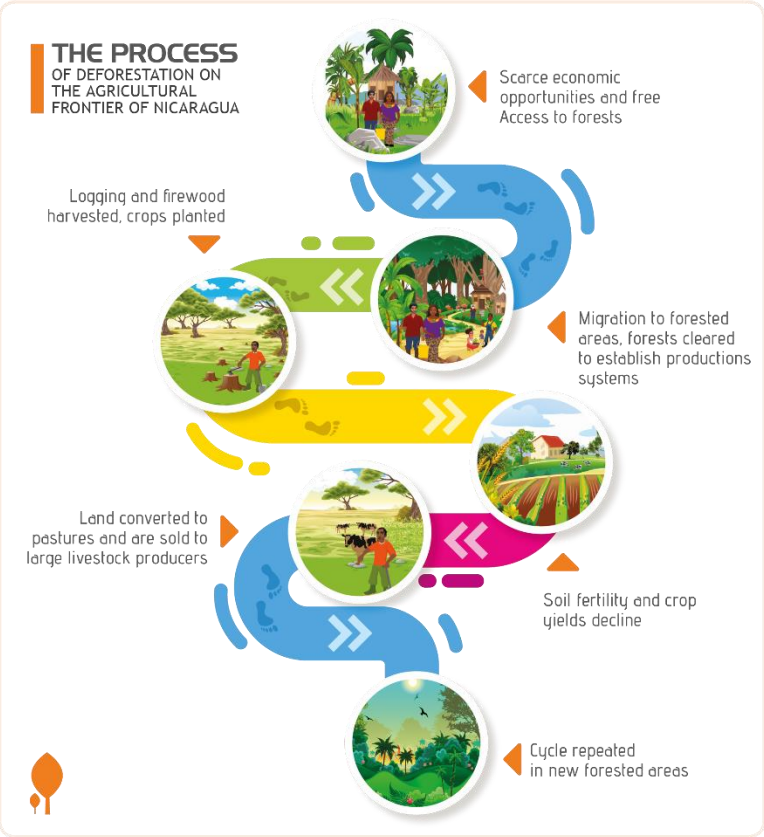
Formal Dairy Value Chain: Approximately 25% of Nicaragua's dairy production passes through the formal value chain. In this chain, farmers sell milk to a cooperative or individual business collection centers that aggregate dairy products to either make cheese or yogurt or to collect and chill milk for sale to large industry. Cooperatives that aggregate chilled milk pay higher prices than those that make cheese, although they also enforce higher quality standards. The milk, cheese, and yogurt in the formal cold chain are sold to national and regional consumers through formal marketing channels.

Beef Value Chain: Farmers typically sell weaned calves either to another farmer that develops or fattens the calf or to an intermediary who aggregates and sells cattle to other farmers or to industrial feedlots and slaughterhouses. After slaughter, beef and other byproducts are sold into national and international markets. In 2015, Nicaragua sacrificed more than 677,000 head of cattle, of which 83% were processed principally for export by the 5 principal slaughterhouses. Seven slaughterhouses are projected - 5 in Managua, 1 in Boaco, and 1 in El Rama in the RACCS. In recent years, the beef value chain has begun to incorporate more intensive on-farm cattle development and the use of feedlots. According to CANICARNE, the five principal feedlots are processing 180,000 head/yr.

Sector participants include: i) public sector institutions such as MAG, MIFIC, MINSA, MARENA, MEFCCA, DGPSA, INTA, MHCP and BFP; (ii) private sector organizations such as CANICARNE, CONAGAN, FAGANIC, UNAG, and UPANIC; (iii) industrial slaughterhouses such as NUEVO CARNIC, SAN MARTIN, NOVATERRA, CONDEGA y MACESA; and (iv) municipal and rural meat processors.

According to TechnoServe (2017) and IICA (2014), the Nicaraguan livestock production chains supplying these markets is characterized by low investment, low input use, low cost, and a low quality production model based on the substitution of natural capital for inputs (Figure 14). Although the model requires little capital, it is characterized by practices such as the use of low quality pastures, inadequate pasture rotation, low stocking rates (the production density of about 1 head of cattle per hectare is the lowest in the region), and low use of technology. As a result, these systems produce low yields and relatively stable, but low incomes, with low levels of risk (Lopez, 2012; IICA, 2014; TechnoServe 2016).

The process of deforestation on the agricultural frontier of Nicaragua (Polvorosa y Bastiaensen, 2016, in ERPD, 2019).



This model is a response to low capitalization and investment capacity of farmers, difficult access to credit, low technological capacity of farmers, and low-priced local and international markets (e.g. markets for dairy products in El Salvador and Honduras) that place little value on product quality or production methods (Lopez, 2012; IICA, 2014)[18, 19] (Also see Annex 3 for more detailed information on the livestock sector). Small farmers are reluctant to invest in inputs (such as forage and mineral salts) and infrastructure (such as fencing and water systems) to intensify production because they lack capital or knowledge of these technologies and are able to achieve substantial output by using the natural capital of their relatively large land holdings. Large livestock producers are less limited by capital, but also prefer to expand production through increases in farm size instead of farm intensification.

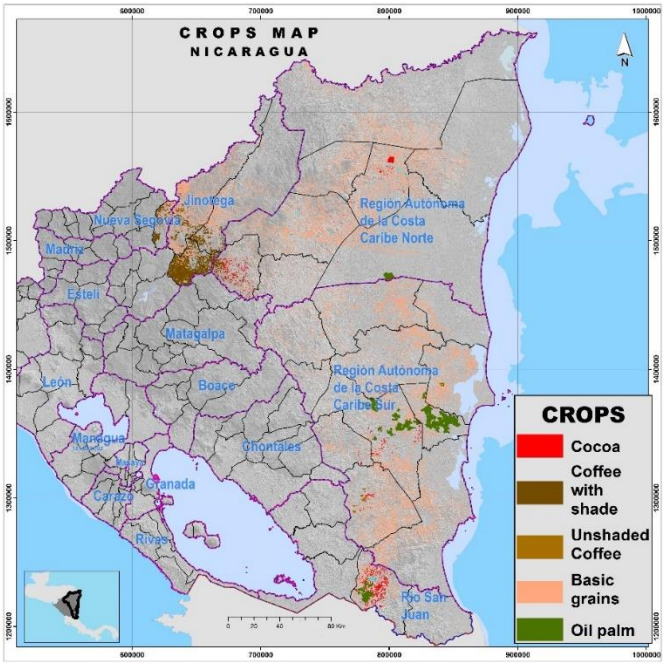
Apart from production objectives, forest conversion to pasture is also used by the poorest settlers to increase their capitalization. These settlers, unable to even invest in animals, clear forest and establish pasture for direct lease or under shared production arrangements with larger and better capitalized cattle-ranchers. Others engage in land speculation, clearing forests in order to charge higher sales prices for lands that have been "improved" by forest clearing. Once the lands are sold and profits taken, these settlers then repeat the cycle in new areas of the agricultural frontier (Lezama, 2007[20]; Bermúdez et al., 2015)[21].

This context is an impediment to more intensive and productive land use. The SPPP (2016)[22] states that *"the abundance and low price of land, in combination with low labor costs, has never motivated large farmers to increase their productivity through technological improvements, mechanization and irrigation, because the demand for agricultural products can be satisfied by expanding the agricultural frontier, based on purchasing cheap land…."* as shown in the model illustrated in Figure 15. Thus, in the face of unprotected forest areas with free access at attractive prices, efforts destined to promote changes in farming are hindered and will fail to halt the advance of the agricultural frontier, as long as the agricultural system based on the purchase and increase of relatively cheap farmland persists (Tomich et al., 1998[23]) and market signals remained unchanged. It is only as land becomes more expensive or restricted or changes in market demend occur that farmers will choose to increase production by using intensive farming techniques (Kaimowitz & Angelsen, 2008[24]; Polvorosa and Bastiansen, 2016; White et al., 2001[25]). It should be noted that recent tendencias toward livestock intensification may be due to decreasing land availability, the emergence of markets for sustainable livestock products, the entrance of more agro-business oriented investors, and greater awareness of the environmental impacts of extensive cattle production.

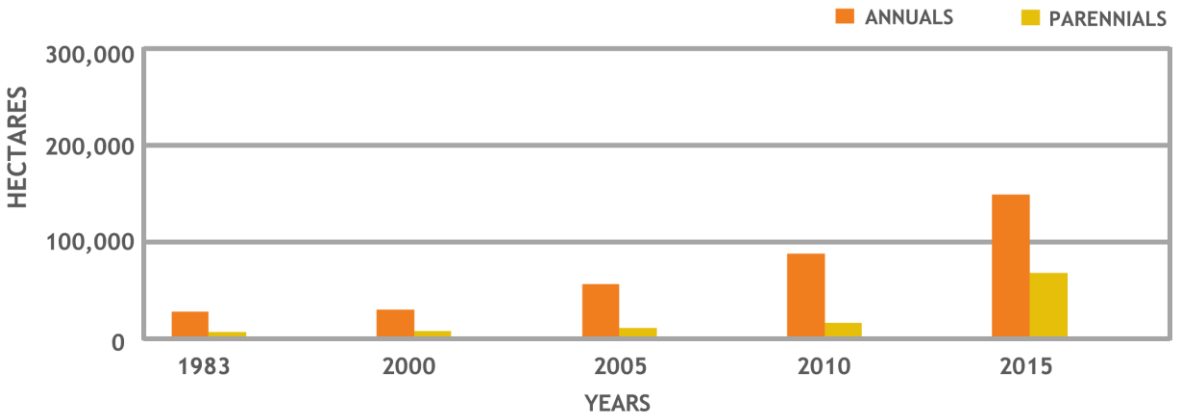
Extensive Crop Production

Crops, alone or in sequence with cattle raising, also contribute directly to deforestation. Principal annual crops include corn and beans, while important perennial crops include oil palm, cocoa, coffee, and coconut. While annual crops are widely scattered throughout the CR, the majority of the perennial crops are found in the RACCS. Since 2000, cropped areas have about doubled every five years, from 37,433 ha in 2000 to 216,234 ha in 2015. The cropped area in 2015 included 147,885 ha of annual crops and 66,909 ha of perennials (**Error! Reference source not found.**). A large proportion of this area was planted between 2010 and 2015, since net increases of about 66,000 ha of annual crops (the majority rice and beans) and 57,000 ha of perennial crops were noted during this period.

Location of annual and perennial crops in Nicaragua.



Annual and perennial crop cover in the Caribbean Coast, 1983-2015



Most (61,000 ha) of the increase of annual crops during the latter period was associated with forest conversion, mainly by small producers. Most annual crops are presumably planted for cash and subsistence purposes, as a stage prior to the establishment of pastures or perennial crops. In contrast, only a third of the new area of perennial crops originated from forest, while more than half of the perennial crop area originated from pasture.

As in the cases of livestock, crop production and cultivated areas have grown at a faster pace than per hectare yields, suggesting that increased demand for crop products has been satisfied largely by increasing the area under production instead of increasing productivity per hectare.

Principal actors related to perennial crop production vary: coffee is dominated by individual or associated producers; coconut, oil palm, and commercial forest plantations are dominated by agribusinesses; and cocoa includes businesses as well as individual producers. Most (96%) of the business are small, having less than 50 employees (CODEXCA - PRONicaragua, 2015[26]).

A brief characterization of the principal perennial crops, based on limited available information from a variety of sources, is shown in **Error! Reference source not found.**. The largest areas of perennial crops, and those with the greatest recent expansion in area, are cocoa and oil palm; the latter has attracted interest from medium-to-large businesses. The area of coffee and coconuts is relatively small, since these crops have been promoted only recently. Coconut has attracted interest from medium-to-large businesses, including Coca Cola, and are projected to cover 15,000 – 20,000 ha in the near future, but most of the coconut crop is in the development stage. The situation of commercial forest plantations is unclear, since approximately 17,500 ha were reported in the Caribbean region as of December 2015[27], but only 2,892 ha are registered in the RACCN (Cabrera and Terrero, 2016). Adicionally, 54,678 ha of forestry plantations have been established by small and medium farmers, assisted in part by the social Reforestation Cruzade Program of INAFOR, but the location and status of these plantations is unclear.

It should be noted that government plans aim for an increase in agricultural production of 4% annually and PRONicargua projects an additional $120 million in investments in teak, cocoa, oil palm, coconuts, and tourism for the 2017-2019 period. The potential deforestation associated with this growth can be largely avoided by intensifying production and making use of already cleared lands, a tendency currently evident in the livestock sector in the Caribbean[28], and the promotion of reduced-deforestation sustainable production systems. Public sector productive investment ($58 million) during 2014-2017 in

the Caribbean coast, mainly via agricultural projects, suggest that efforts are being made to intensify the production of perennial crops (mainly cocoa and coffee).

Characterization of principal perennial crops in the Caribbean coast.

Crop	Area (ha)	Production	Location	Principal Actors	Markets	Investment[29,30]
Cocoa	Approx. 30,000 total; aprox. 17,000 ha in production.	0.4-0.5 t/ha; 6,525 t in 2016; Value: $7.1 M en 2015	RACCN: Waslala, Rancho Grande, Mining Triangle RACCS: El Rama, Muelle Los Bueyes, Nueva Guinea, La Cruz, Kukra Hill, Bluefields Rio San Juan	Approx. 11,000 families, 62 producer orgs., 65 collection centers International Buyers: Ritter Sport (80%), Etiquable, ECOM, Ingemann, Cacao Bisiesto National buyers: Momotombo, Castillo del Cacao, wholesale and retail outlets	Germany, France, Holland, Italy, Denmark, US, El Salvador, Guatemala	$23.7 M (2014 – 2016)
Oil palm	Approx. 30,000 (22,000 ha in production)	70,000 t crude oil Value: $33 M (2016)	RACCS: Boca de Sabalo, El Rama Rio San Juan	300 SAM producers (20% prodn.), 4000 employees, 8 large businesses: Palcasa, Nicavista, Extraceite, Kukra	Mexico (70%), national market	$375 M to date, $150-200 M additional in next 5 yr

				Development Corp., Oleo Caribe, CANSA, San Jose, Caribbean Dream World		
Coconut	Approx. 15,000 ha planned	n.d	RACCS: Nueva Guinea, Laguna de Perlas	Coconut Corp., XAGRO, Coco Vida	Export	n.d.
Robusta coffee	1700 ha	n.d. Most plantations are in the early stage of production	RACCS: Nueva Guinea, Muello Los Bueyes, Paiwas RACCN	Cooprodecar, Digranisa,	National markets, export	n.d.
Bamboo	3600 ha	18 t fiber/ha/y	RACCS: El Rama y Kukra Hill	EcoPlanet Bamboo		$40 million/5 y; 350+ employees
Natural forest logging and resin	91,768 ha 2000-2015 under all types of forestry mgmt. plans and permits	77,000 m^3 transported to sawmills in 2013 278,000 m3 planned in 2017-2018	RACCN: Puerto Cabezas, Waspam, Mining Trainagle, Prinzapolka RACCS Rio San Juan	2,000 small producers, loggers, forestry technicians and regents, truckers, 21 primary processosrs, and 300 secondary processors in the RACCN; Vida Group Internacional (pine resin)	Export, local processors	$13.2 M (2013-2015) in the RACCN and $7.2 M (2013-2014) in the RACCS

Forest plantations	Approx. 17,500 commercial plantations in the Caribbean (2015); 54,678 ha planted by SAM producers nationwide	4000 m^3 nationwide in 2013	RACCN: Bonanza, Prinzapolka RACCS: Nueva Guinea,	MRL Forestal, NORTEAK, Nica Forestal, New Forestry	US, European Union, Costa Rica	$110 M total to 2016; $9.9 M for teak (2014-2016)

n.d. no data.

In this context, the relation of the expansion of the cover of pastures and perennial crops and deforestation is complex. Limited data suggest that the increase in cover of perennial crops during 2010 – 2015 has come mainly at the expense of pasture (56%), but also forest (33%) and other land uses (11%) (see Annex 2). At the same time, pasture area exhibited a net decreased by 147,000 ha (Figure 10), due to the creation of about 275,000 ha of new pastures from forests (a decrease in pasture-associated deforestation relative to earlier periods), but the concomitant conversion of about 420,000 ha of pastures to other uses, mainly secondary vegetation (about 345,000 ha of "tacotales") and perennial crops (about 35,000 ha). These data suggest that livestock intensification and a change from pastures towards other, more productive land uses is causing the recent reductions in the rates of deforestation.

There are various productive factors underlying extensive land use by both livestock and cropping systems. One is the limited access and use of credit associated with: the high transaction costs of loans, lack of formal loan guarantees, poor technology adaptation resulting in low agricultural productivity and high risk, limited availability of long-term credit funds or financial products adapted to farming conditions, and the lack of a credit or agribusiness culture (IICA, 2014).

According to the SPPP (2016), the percentage of the combined portfolio of all private banks dedicated to agriculture at the national level is only 9%, an amount of approximately $316 million. The CENAGRO (2011) survey indicates that only 7% of farmers access credit, which are aimed at large agricultural enterprises and farmers who can present the corresponding guarantees and have good farm organization (IICA, 2014). In the case of cattle ranching, the percentage of the bank credit portfolio is only 2%, equivalent to approximately $72 million, and only about 3% of livestock farmers access credit.

However, analysis of outstanding credit portfolios of banks and financial institutions in the CR indicates that credit for livestock grew from $10 million in 2012 to $35 million in 2016 (an increase of 326%), which combined with the decrease of pasture area is consistent with the hypothesis of livestock intensification by the substitution of financial for natural capital.

Another underlying productive factor of extensive land use is the low level of technical knowledge and capacities of farmers, which is related to the limited coverage and minimal effectiveness of technical

assistance programs. According to the IV CENAGRO[31] agricultural survey, only 11.4% of farmers receive technical assistance and/or training, a good proportion of which is provided by input suppliers, industrial plants, universities, international development projects, livestock or farmer associations, or NGOs. As a result, in many cases farming systems have changed little in 60 years. In the cattle sector, production indicators continue to be low despite a large number of projects focused on sector improvement over the last decades (IICA, 2014).

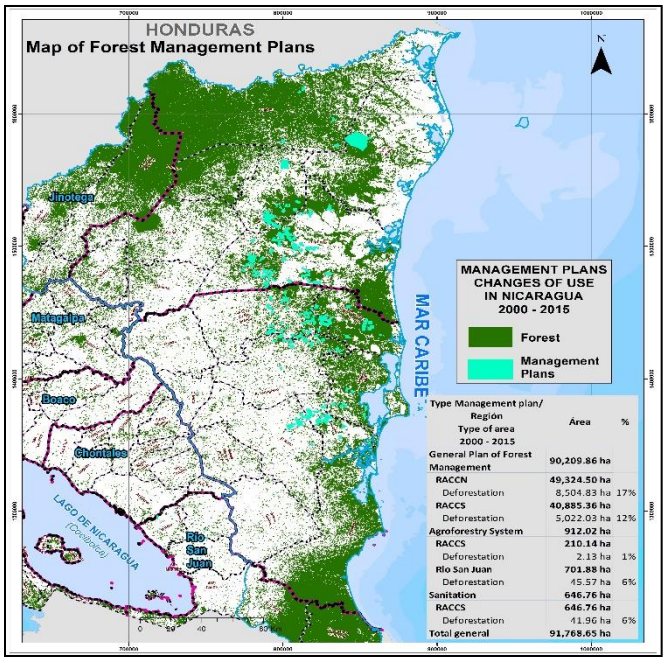
Local and international markets undemanding of quality and production methods, also contribute to extensive land use of low productivity. Local agricultural markets provide constant demand but mainly value low prices, instead of product origin, legality and quality. Even important regional markets for Nicaraguan agricultural products, principally El Salvador and Honduras, are undemanding as to the quality of agricultural products originating from Nicaragua´s agricultural frontier (Lopez, 2012). Moreover, the relative lack of capital and access to loans prevents farmers from investing in the infrastructure and inputs necessary to comply with the quality standards of more demanding markets that pay higher prices. As a result, the profitability of livestock systems is low, but relatively stable, due to the constant flow of income produced by domestic demand and the growth of export demand.

Logging

Logging is relatively unimportant as a cause of deforestation, but is implicated in forest degradation. Projected timber production of approximately 280,000 m^3 for 2017 by the System for Production, Consumption, and Commerce is equivalent to the selective exploitation of less than 47,000 ha (less than 2% of the actual forest area), assuming a harvest yield of 6 m^3/ha[32]. General forest management plans between 2000 and 2017 only covered 90,000 ha and were likely sub-expolited, since imited data from 2014 (INAFOR, 2014), the first year after a 7 year logging ban, indicate that only 76,873 m^3 of timber of the 103,711 m^3 of timber authorized from the were transported to sawmills, an apparent under-utilization rate of 24%.

Despite the low use and sub-utilization of forestry plans and permits (General Forestry Management Plans, Agroforestry System Permits, or Salvage Permits), they have an beneficial effect of being associated with low rates of deforestation (**Error! Reference source not found.**). Annual deforestation rates of areas under General Forestry Management Plans during 2000 – 2015 were estimated to be 1.13% in the RACCN and 0.70% in the RACCS, which are similar to or lower than the low rates of deforestation observed in protected areas within indigenous territories (1.07%, see Table. 1). Moreover, deforestation associated with the other types of permits was minimal. This suggests that clearly defined rights and economic interests in forest management can help reduce deforestation through the assertion of greater control of forested areas by permit holders.

Deforestation associated with forestry management plans and permits, 2000-2015.



The potential causes of apparent sub-utilization of forests are many and complex. The majority of forests are located in indigenous territories where available capital, equipment, technical knowledge, and commercial contacts are limited. This situation creates major challenges for developing forest management plans as well as successfully undertaking timber logging and processing activities which are capital intensive and logistically challenging. Moreover, the knowledge, norms, and procedures of indigenous communities and territorial governments are oftentimes inadequate in order to attract investments and/or to effectively partner with investors interested in forest use and management or to oversee investor activities.

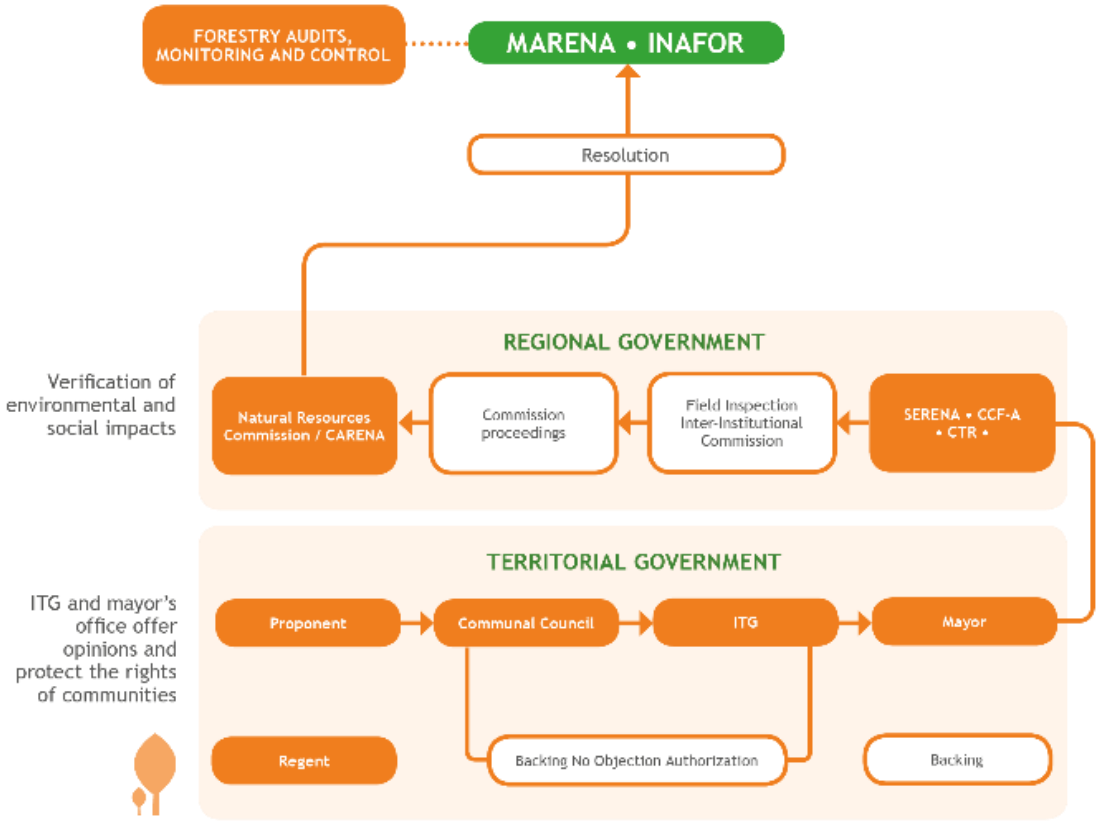
In relation to degradation, the lack of opportunites for legal forest management may thus be creating conditions conducive to small-scale but widespread illegal forest extractive activities, such as logging, firewood harvests and charcoal production, leading to forest degradation.

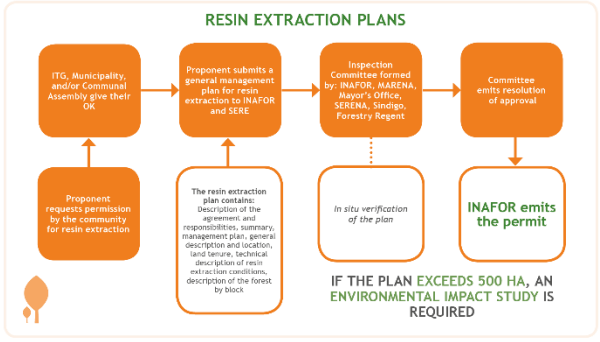
Processes for obtaining the four types of forestry permits, (forestry management plans, domestic use permits, salvage permits, and resin permits[33]), shown in the Figure below, can also act as disincentives for forest management, and thus provide incentives for the illegal extraction of forest products. While not overly expensive with regards to those of other Latin American countries[34], the procedures for obtained approvals for these permits are time-consuming and bureaucratic (especially for the volumes permitted such as in the case of the domestic permits), requiring multiple steps and levels of oversight and approval (**Error! Reference source not found.**). In addition, fees charged by forestry regents to formulate general forest management or annual operating plans appear to be very expensive, about $16/ha for General Forestry Management Plans (PGMF) and about $20/ha for Annual Operating Plans (POAs), which is suprising given the relatively large estimated number of foresters (3000) and forestry mid-level forestry technicians (500)[35] in the RACCN.

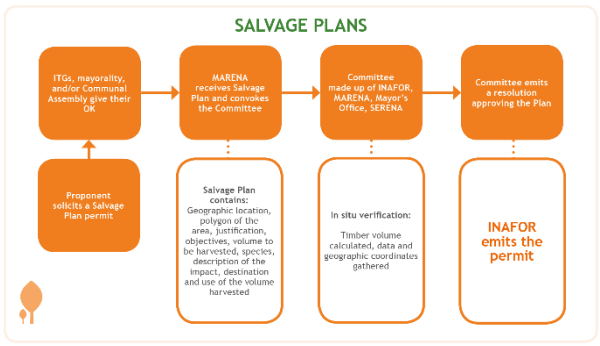
Moreover, once approved there is little supervision of these forestry plans and permits due to underfunding and understaffing of INAFOR, limited capacity of SERENA at the regional government level, low local monitoring capacity of indigenous territories and communities, and little legal enforcement on the part of the environmental inspectors of MARENA and the national Attorney General´s office.

Another element that contributes to the illegal extraction and degradation of forests is related to the limited entrepreneurial capacities of the communities, which hinder the consolidation of new formal forestry companies that could increase the value of the concessions, through higher added value production.

Flow diagram for the authorization of general forestry management plans, and domestic, salvage, and resin extraction permits.







Institutional/Legal Causes

In recent years, the consolidation of Nicaragua's institutions has increased significantly. A robust legal framework and policies have been formulated in relation to land rights and natural resources, environmental protection and sustainable development, and the indigenous and afrodescendant territories of the Caribbean Coast, which represent 31.4% of the country's total area, have been titled. Autonomy for the Caribbean regions has also been established, at the same time that efforts have been made to better integrate these regions into the national economy and political life.

Nevertheless, in the face of migration pressure due to demography, poverty and markets, it is necessary to reinforce and extend these positive trends. In this sense, consultation with stakeholders from the public and private sectors of the Caribbean and national levels identified the management, monitoring, and control of land use and natural resources, including the enforcement of laws and regulations, as critical institutional needs (see ERPD Table 23 in Section 5), since most deforestation unrelated to approved forest extraction is illegal (see Section ERPD 4.4). As a result better coordination, and improved institutional capacities are needed, as mentioned in the previous sections. Additionally, needs at other higher hierarchical levels include:

- Better harmonization and coordination of sectorial policies, based on a shared vision of the need to avoid deforestation,
- Increased use of environmental information in coordination and decision making horizontally (across sectors) and vertically (at multiple government levels) in order to develop better plans and policies and to better respond to the impacts they produce.
- Greater institutional resources, especially for information, monitoring, and control, in order to implement these changes.

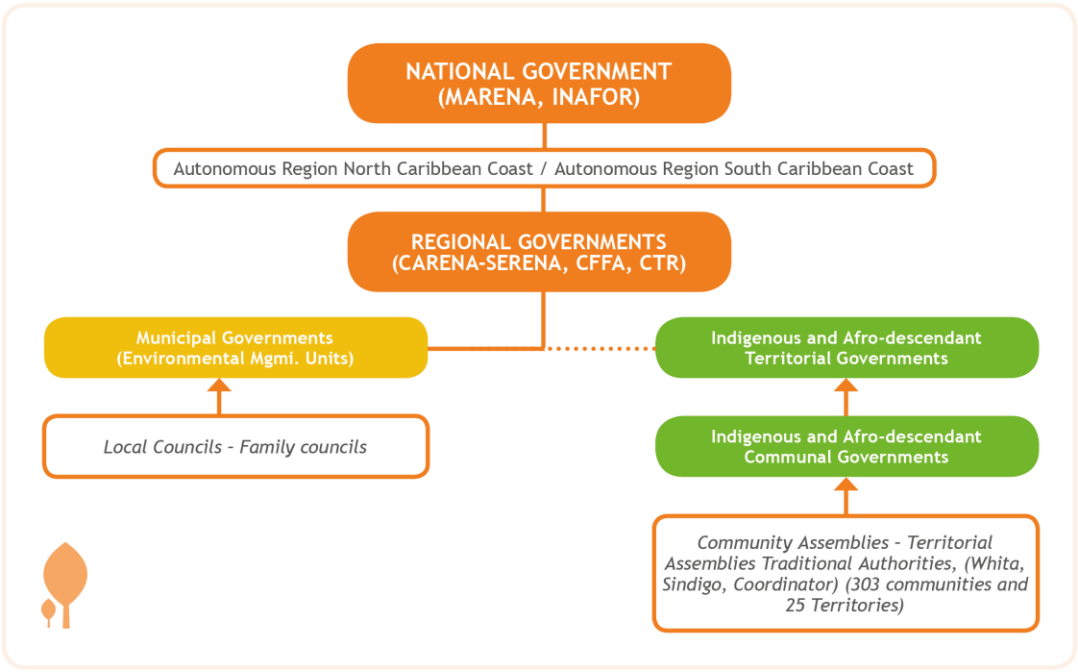
Consideration of these issues should take into account the structure of governance in the Caribbean region which is characterized by two administrative systems (national and territorial) and five levels of government and the roles of the natural resource institutions involved. This system is the result of the historical and political evolution of this region, the process of autonomy, and the traditional uses and customs of the indigenous and afrodescendant peoples and has been instrumental in the recent progress achieved in the region.

Within the "formal" or public administration governance structure for natural resources there are three hierarchical levels of government: the national government, the autonomous regional governments (RACCN and RACCS), and the municipal governments. However, within each of the indigenous and afrodescendent territories, there are two autonomous traditional governance structures: the territorial governments and communal governments. Within the territories, where the traditional and public administrations overlap, the territorial governments are responsible for actual decision making (although most of their budget is controlled by the central government), whereas the function of the public administration governments is more consultative or to provide opinions or oversight.

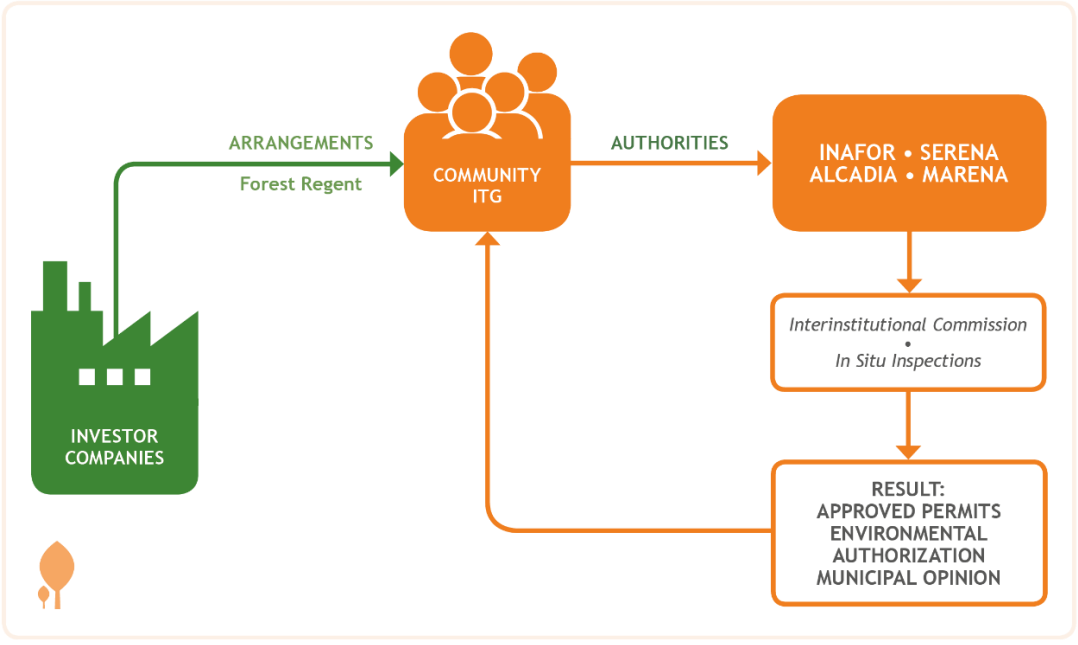
The national government is responsible for establishing the regulatory framework for land use and the forestry sector via laws, decrees, resolutions, and obligatory technical norms applied by the ministries and the regional and municipal governments. The autonomous regional governments of the Caribbean Coast articulate national land and forestry policies with specific proposals and actions of the indigenous

peoples and ethnic communities, and are assisted in this task by the Secretary for the Development of the Caribbean Coast (SDCC). At the local level, they are aided in this process by the municipal governments. However, in the indigenous and Afrodescendant territories, the territorial and communal governments are responsible for decision making related to land and natural resource use and management, in line with the autonomy of the RACCS and RACCN. The roles of these governments in natural resource decision making in communal lands is shown in the figure below.

Levels of government in the Caribbean region.



Process of approval for natural resource use in communal lands.



Sectorial policies and budgets determined at the national level are implemented at the local level via branch offices of the ministries in selected population centers or through the public administration system via the regional and municipal governments. As a result, the degree of integration of environmental or deforestation considerations in non-environmental sectors and policies is dependent on high level coordination via the Secretary for the Development of the Caribbean Coast and the Production, Consumption, and Commerce cabinet that groups the agricultural, forestry, family economy, and industry sectors. It also depends on the availability and use of adequate and relevant information.

Under this system, different governmental levels have different critical functions and roles related to critical aspects of land and forestry management (planning, authorization, monitoring, and control and enforcement.

Critical functions and roles of different levels of goverments in forest and natural resource management.

Level of govt.	Assignment of Rights	Admin.	Monitor	Enforcement
National	INAFOR: regulates forests, emits permits. MARENA: regulates use of natural resources, approves changes of use. MAG: formulates agriculture and forestry policies. INETER: land use classification.	INAFOR: Forest lands and permits. MARENA: Natural resources, forests in PAs.	INAFOR: Forest lands and permits. MARENA: Natural resources, forests in PAs. INETER: monitors resources. MAG: Supervises and informs re: forestry and agricultural sectors.	INAFOR: sanctions forestry infractions. MARENA: sanctions natural resource infractions. PGR: Prosecutes natural resource or forestry crimes.
Regional govts. (mainly through CARENA and SERENA)	Articulate with national, municipal, territorial and communal governments	SERENA (includes environmental evaluation of permits).	SERENA. Monitors environmental and forestry	

	Approve projects and plans, formulates environmental regulations. OK use of natural resources, approves forestry mgmt. plans.	CCFA and CTR coordination and technical advice.	plans, projects, and use.	
Territorial govts.	Monitor and administer communal property and administer communal property Emits OK for natural resource use in territories	Coordinate and assist decisions of community assemblies	Monitor and administer formal and verbal contracts	Provide support.
Communal govts.	Forest owners and starting point for natural resource use authorizations. Authorize domestic forestry permits.	Administer natural resources in the community	Sindigo and Commission monitor contracts of natural resource use.	Provide support.
Municipal govts.	Emit opinions on natural resource use, contracts or concessions in their jurisdictions, outside of indigenous territories.	Participate in environmental impact studies. Coordinate use and mgmt. of natural resources.	Participate in inter-institutional monitoring commissions.	Provide support.

Analysis and consultation of this scheme with regional and territorial representatives suggest that a number of institutional weaknesses exist with regards to the management of land and natural resource in the CR which compromise the abilities of those governments to plan, monitor, and control land and natural resource use.

These limitations, hierarchically arranged, include:

- *Application of laws and management instruments.* Nicaragua´s legal and policy framework for natural resource management and forestry is robust, but its inconsistent or partial application leads to gaps in coverage, red tape, and personalized interpretation, thus posing barriers to sustainable land use, hindering sustainable natural resource management, and contributing to land use conflicts, the use of unsustainable practices, and the conversion of forests to inappropriate or illegal land uses.

Control and enforcement of land and natural resource is largely administered by national level institutions and their regional offices (MARENA, INAFOR, PGR), but is compromised by staff and other resource shortages, which effectively result in partial application of management instruments and sporadic enforcement. In some cases, outdated information (see below), and limited social control of decisions and administration of communal leaders may also lead to the misapplication of regulations and norms.

- *The accessibility, dissemination, and use of information.* The availability, quality, exchange and use of information about land and natural resources at a national level and in particular in the Caribbean, is often dispersed among institutions, which hinders strategic planning, timely decision making of decisions, and a more effective daily management of land and natural resources.

With respect to the autonomous regions, information on soil and natural resources is reported from the community, territorial and communal bases to regional links through established communication channels. The SINIA information nodes in the regions have been technologically strengthened with computer equipment that facilitates the management and processing of the reports sent by local monitoring teams. Information gathering, however, is limited and information dissemination needs to be improved.

- *Monitoring of land use and natural resources.* Monitoring is a vital source of information for management. At present, the monitoring of natural resources is carried out: 1) through the analysis of satellite images prepared by INETER, MARENA and INAFOR; and 2) local monitoring by regional teams of the GRACCs, community and territorial governments. Currently, the reports generated by the national monitoring committee needs to be better consolidated, articulated, and disseminated. Technical support to the monitoring brigades of the communal governments is also needed in order to optimize local management, control and monitoring of the resources of each territory.

Partially overlapping institutional responsibilities for monitoring, the lack of use of shared indicators and criteria, and the low institutional capacities contribute to monitoring deficiencies and subsequent informational weaknesses, especially at the territorial and communal levels. The lack of up-to-date or real-time information at both the regional and local scales inhibits timely responses to deforestation and potential land conflicts, as well as management decisions and longer-term planning based on solid information.

- *Harmonization and coordination of policies and levels of government.* This multi-level governance structure and the partial overlap of responsibilities engenders the need for a large

degree of inter-level consultation and coordination based on reliable information and feedback, which is only partially achieved. Within this system of shared institutional responsibilities, effective coordination of policies, programs, and projects is a challenge, especially given resource, capacity, and information limitations and the remoteness of some areas. Moreover, there is little institutional prioritization given to environmental problems, since the environment is not a high priority in the national budget. As a result, sectorial integration of measures to reduce deforestation related to infrastructure development (roads, energy, and water which consume more than 75% of the public budget in the CR), or the promotion of more sustainable agricultural production is low, and represents a threat to remaining forests, as evidenced by recent deforestation along the newly constructed road to Bluefields.

- *Financial resources and institutional capacities.* Insufficient budgets, equipment, and trained personnel, especially at the territorial and communal levels, contributes to all of the limitations listed above and affect the good governance of natural resources and land use in the Caribbean region, especially at the regional and local levels.

It is fair to recognize that the governance scheme described above, and the societal values that it embodies (dialogue, consultation, solidarity, shared responsibilities and cooperation) has helped conserve the large quantity of forests found in the indigenous and Afrodescendant territories and has contributed to social peace, despite limited resources and capacities. The governance model promotes the following significant benefits:

- ✓ Assistance and mutual cooperation among governments, communities, and the private sector.
- ✓ Multiple checks for improved control and transparency in the process of letting permits and authorizing forestry management plans which, in turn, improves the climate and security of forestry-based investments and businesses.
- ✓ Ample opportunities for consultation with interested parties and facilitation of inputs into the policy and regulatory processes.
- ✓ Strengthening traditional forms of government of indigenous peoples and people of African descent.

Bio-CLIMA will leverage and take advantage of these benefits while addressing outstanding institutional and governance needs.

1.3.3 Assessment of the major barriers to REDD+

Recent tendencies suggest that government policies and programs related to the titling of indigenous territories, investment promotion, regional autonomy, large-scale land use monitoring, the intensification of livestock and land use, and the reforestation and regeneration of degraded lands are beginning to slow deforestation. However, these measures can be rendered even more effective through the reduction of the following inter-related barriers.

1) *Low environmental profile.* The profile of environmental / forestry protection in sectoral strategies and plans and in government operating budgets is low. Environmental sustainability needs to be better integrated and visualized with indicators that measure progress in economic development plans, programs and projects, preferably through the general incorporation of

coherent environmental indicators and a shared "vision of success" as part of the institutional planning and monitoring processes.

2) *Non-integrated sectoral approaches.* Policies often demonstrate a preference for agricultural development, even in areas with a forestry vocation. This results in a lack of integration of forestry and agriculture in a conservation-production approach. Resistance of some sectoral actors to the application of environmental/forestry instruments and regulations is also present. As a result, greater efforts should be made to include environmental indicators in sectoral planning and to more closely integrate agricultural, forestry, and infrastructure sector development

3) *Limited institutional presence.* There is limited institutional presence in extensive areas of the forested regions of the Caribbean and travel costs are high due to limited means of transport and the long distances involved. This limited presence negatively impacts information flows and communication, monitoring, and the response to problems as well as the application of laws, policies, and regulations.

4) *Cultural barriers.* Although Nicaragua has been successful at promoting public campaigns for fire prevention and control and reforestation for environmental protection, cultural values among some segments of the population undervalue the country's forests and promote deforestation.

5) *Economic and knowledge barriers* by lenders and lendees, as well as high transaction costs, limit access to credit and TA and hinder the widespread adoption of more sustainable production practices, especially on the part of small and medium-sized producers.

6) *Local or regional markets* for agricultural/livestock/forest products do not recognize quality or sustainable production techniques and hence do not compensate increased investments in these areas. Furthermore, the absence of national markets for ecosystem services reinforces the sub-valuation of forests.

7) *High costs and limited economic returns* of conservation discourage government investment, and hence the adequate protection of protected areas. On the other hand, ecotourism, a potentially important source of private investment in support of conservation, is incipient and of a relatively small scale.

8) *High transaction costs of environmental/forestry compliance* and bureaucratic red tape for small and medium owners are disincentives for sustainable forest use and management.

1.4 Assessment of land and resources tenure[36]

Nicaragua is a pioneer and regional leader in the development of a robust institutional and legal framework as regards the restoration and protection of the rights of indigenous and Afrodescendant peoples. Land tenure is legally guaranteed and there are no barriers or conflicts as concerns legal property rights. The right to property and ownership cannot be the subject of a legal dispute.

The Constitution (Articles 5, 44, 89, 99, and 103) recognizes and guarantee:

- ✓ Different forms of property (communal, public, private, etc.).
- ✓ The use and enjoyment of the forests and lands and communal forms of property by indigenous and afrodescendant peoples.
- ✓ The right to private property.
- ✓ Land tenure, without discrimination, with the objective of producing wealth while complying with the social functions of land in order to benefit the country and its inhabitants.
- ✓ State responsibility for the protection, development and promotion, together with its inhabitants, of land-based activities and the protection of its natural resources.
- ✓ Respect for the legal dominion and possession of property rights, except in specific cases determined to be otherwise by the law.

1.4.1 Types of land tenure and its uses

A full 98% of the CR is either communal or private property, while the remaining 2% has yet to be titled. Fifty-three percent (53%) of the area is privately owned, while the remainder is communal property. The use and usufruct of these zones affect land management, natural resources, protected areas and the territories of originary and afrodescendant peoples.

According to Law 445 (Communal Property Regime of the Native Peoples and Ethnic Communities of the Autonomous Regions of the Caribbean Coast and the Bocay, Coco, and Maíz Rivers), and the civil code of Nicaragua, **communal property** is defined as collective and is made up of land, water, forests and other natural resources that have traditionally belonged to the community. It includes the traditional knowledge, intellectual and cultural property, biodiversity and other goods, rights and actions that belong to one or more indigenous or ethnic communities. Communal land cannot be taxed, sold or divided and the property right does not end in time.

For its part, **private property** is the legal system that contemplates the rights held by owners, as individuals, associates, or collectives, for the dominion, use, enjoyment, and transmission of property. Under this system, property is considered the right to have and enjoy an asset without any other obligation apart from those established by the law. With regards to private property, most such property (60%) is located in RACCS, 23.8% in RACCN, 13.6% in the BOSAWAS Biosphere Reserve, and 2.6% in the Indio-Maíz Biological Reserve.

Private rights to natural resources and soil use

There is a substantial difference between communal and private property, namely that the former cannot be transferred, attached, taxed or sold. Thus, there can be no legal trade nor can rights be acquired by alleging possession, use or usufruct.

A summary table of the differences between communal and private property regimes is shown in Table 15; their presence in the project area is presented in **Error! Reference source not found.**; and a map of communal and private property in the project area is shown in **Error! Reference source not found.**.

Differences among private and communal property systems

Private and Communal Property Regimes	
Private	**Communal**
Individual and Associative Rights	**Collective Communal Rights**
Individual or group decisions	Collective decisions made by communal or territorial assemblies
Property can be sold, transferred or taxed	Property is not subject to prescription and cannot be sold, transferred, donated, embargoed or taxed.
	Property can be leased for a predetermined period of time, upon prior approval of its use by communal or territorial assemblies.
Rights can be acquired by: inheritance, possession, and agrarian reform titles	Rights are acquired by: historical presence or assigned by laws or the constitution (Law 28, Law 445).
	Rights cannot be acquired by possession, use and usufruct of the property. Ownership of the land cannot become the subject of legal controversy. The only type of litigation possible is in the sphere of administration when land is under lease or traditional use conceded by the community.
Use and Usufruct: regulated by contracts under the Civil Code.	Use y Usufruct: Traditional and formal contracts, rental, associative and joint ventures are the types of contracts most frequently used.
	Contractual clauses are established by the communities and territories via internal mechanisms and policies (statutes and norms).
	Concessions have to be approved by communal and territorial assemblies, regional councils, and the Nicaraguan government
The administration of Protected Areas is responsibility of the State, and can be shared with local inhabitants via a collaborative management signed by MARENA and the inhabitants.	By constitutional mandate, the state respects that inhabitants of the communities and territories can use and enjoy natural resources of Protected Areas according to their customs, traditions and the law. The administration of Protected Areas is a shared responsibility of originary and Afrodescendant peoples and the state. It takes place through an agreement signed by MARENA and the communities. Protected area management plans have to be approved by communal and territorial assemblies.
Rights to the use of soil and resources pertain to the private owner, except when specially	Nicaragua respects rights to the use of soil and natural resources under the communal and territorial system, governed by tradition and the laws on the matter. If there is to be use and usufruct by

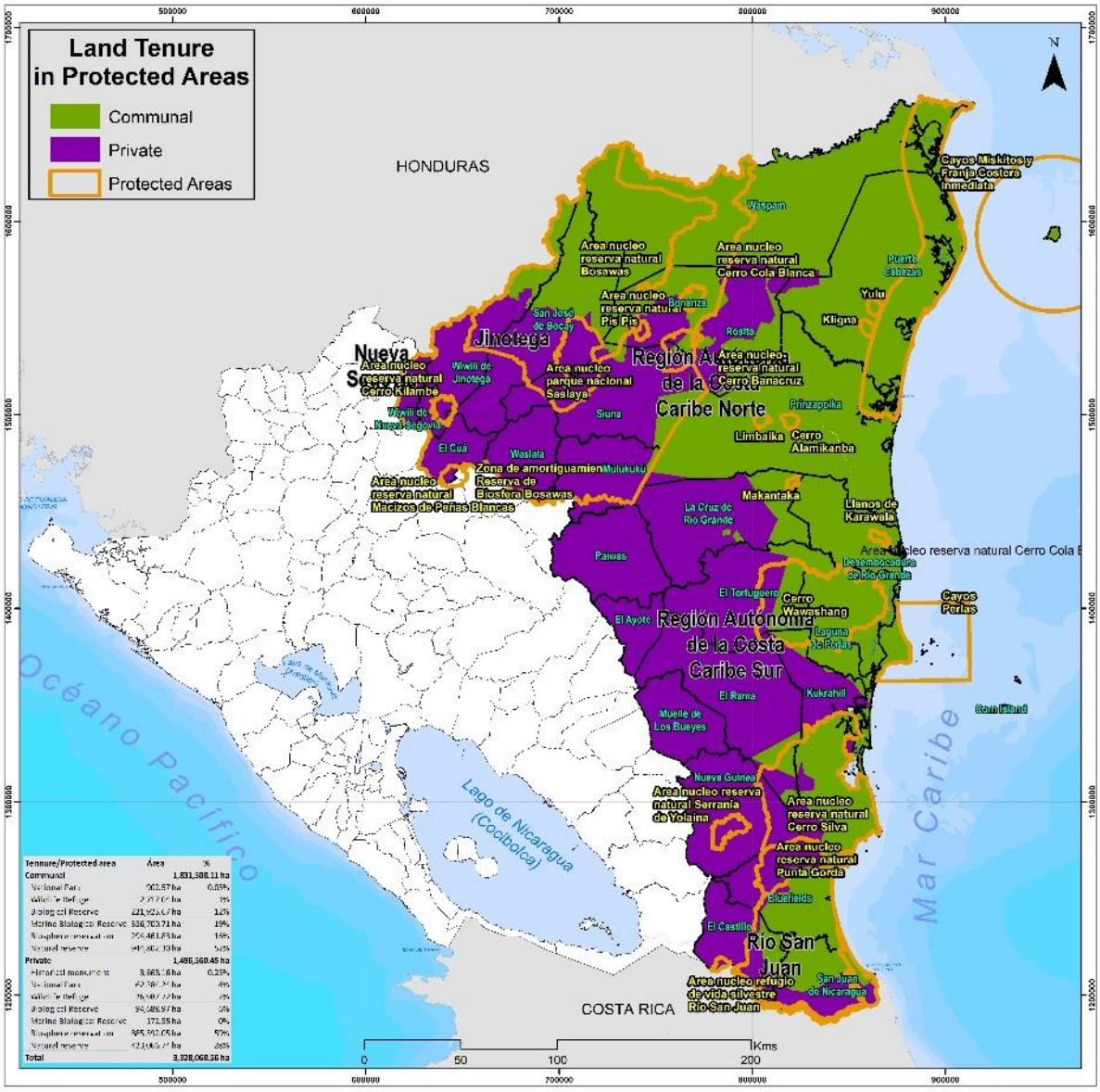
Private and Communal Property Regimes	
Private **Individual and Associative Rights**	**Communal** **Collective Communal Rights**
regulated for reasons of national interest.	public or private entities, the communities in the territories must approve this through their communal and territorial assemblies. Even if the national interest so requires, any use these lands may be put to must be approved by of originary and Afrodescendant peoples.

Property regimes in the project area.

Geographic Location	**% of Project Area**	**Project Area Titled as Communal Property**	**Private Property** **% of Project Area**	**Private Property Titled**
Autonomous Regions of the Caribbean Coast	87.8%	47.9%	39.9%	91.1%
Geographic proportion of the Alto Wangki and Bocay indigenous territory special regime and the BOSAWAS and Indio- Maíz Reserves located in other departments (Río San Juan, Nueva Segovia, Jinotega).	12.2%	5.3%	6.9%	6.9%
Total	**100%**	**53.2%**	**46.8%**	**98%**
By Political Jurisdiction				
Department		**Communal (ha)**	**Private (ha)**	**Total (ha)**
Jinotega		223,301	483,809	707,110
Nueva Segovia		0	40,635	40,635
RACCN		2,401,236	840,616	3,241,852

RACCS		921,581	1,759,814	2,681,396
Río San Juan		115,922	210,936	326,858
Total		**3,662,040**	**3,335,810**	**6,997,850**

Map of communal and private property in the project area.



1.4.2 Tenure in Protected Areas

Protected Areas represent a special case of land tenure, since they contain both communal and private property. There are 22 Protected Areas within the project area, containing 1.83 million ha of communal

lands and 1.50 million ha of private lands, in which the State recognizes communal and private property rights. Of the 22 Protected Areas in the project area, 18 are found in indigenous and afrodescendant territories.

The administration and management of the Protected Areas is the responsibility of MARENA, which acts through the National System for the Administration of Protected Areas (SINIAP). SINIAP implements planning, organization, direction, and control of the Protected Areas in accordance with their categorization and management plans. Of the 22 Protected Areas, 9 need to update their management plans while 13 lack this management instrument.

In some cases, MARENA can cede the management of protected areas to other actors via:

i collaborative management, which is an institutional arrangement based on a shared agreement between MARENA and other actors for the implementation of actions in a specific territory of the Protected Area with the objective of conservation and sustainable use of the area.

ii joint management, whereby collaborative administration of a protected area on communal land is exercised by the state and indigenous and afrodescendant communities. In the project area only the Indio-Maíz Biological Reserve has a joint management agreement with the Rama-Kriol territorial government.

The Bosawas and Indio Maiz Reserves are the largest protected areas in the project area and account for the large majority of the land in protected areas. Indio Maíz contains 94,687 ha of private land and 221,924 ha of communal land (**Error! Reference source not found.**). Bosawas includes 187,029 ha of private land and 493,316 ha of communal lands within its nucleus; in the buffer zone there are another 885,592 ha of private land and 294,462 ha of communal lands ((**Error! Reference source not found.**). The Bosawas buffer zone includes 6 protected areas within its buffer zone: Banacruz Natural Reserve, Cola Blanca Natural Reserve, Pis Pis Natural Reserve, Kilambe Natural Reserve, Peñas Blancas Natural Reserve, and Saslaya National Park that together account for 129,410 ha (104,159 ha of private lands and 25,006 ha of communal lands).

Private and communal lands in the BOSAWAS and Indio Maiz Reserves.

Protected Area	**Private lands (ha)**	**Communal lands (ha)**	**Total (ha)**
BOSAWAS nucleus	187,029	493,316	680,345
BOSAWAS buffer zone	885,592	294,462	1,180,054
BOSAWAS total	*1,072,621*	*787,778*	*1,860,399*
Indio Maiz	94,687	221,924	316,611
Total	**1,167,308**	**1,009,702**	**2,177,010**

1.5 Resources use rights

According to the Constitution and the Caribbean Coast autonomous legal system, property owners are entitled to the use and usufruct of natural resources en Nicaragua, limited only by the national interest, whenever pertinent.

Taking this constitutional precept for a point of departure, there are special laws that include enabling regulations related to rights to forests and land. For instance, article 2 of Law 462, related to the forestry sector, establishes that "the owner of the land also has dominion over the forest cover existing on it, as well as over the benefits derived therefrom," while article 36 of Law 28, the Autonomy Statute of the two Caribbean Coast regions states that "communal property consists of the land, water and forests that have traditionally belonged to the communities on the Caribbean Coast …".

Based on the foregoing, property rights, regardless of ownership, will always determine who is eligible to enjoy the benefits generated by conservation, preservation and the sustainable management of forest resources. These, however, are a shared obligation between the particular owner, the community, the municipality and the Nicaraguan State. In the case of originary and Afrodescendant peoples, in order for the State to make use of its legal prerogative to protect the national interest, it must first seek approval from the corresponding communal and territorial assemblies, as well as the Regional Government Councils.

The right to forest resources is clearly described in the forestry law and its enabling regulations, although the right to forest carbon is not specifically mentioned (see sections 4.5 and 17).

However, the country needs to improve the enforcement of its laws and regulations, as described in sections 4.1 and 4.2, above. Perhaps the clearest example of insufficient monitoring and control is the conversion of forests to other uses in the carbon accountability area, contrary to that which is set forth in the General Law on the Environment and Natural Resources. Oversight and control regarding management plans for protected areas, forests or natural resources are also inadequate, as are the updating and harmonization of community norms and regulations with national law.

1.5.1 Use and regulation of forest resources

- As concerns the environment, the legal framework establishes that owners, holders or usufructuaries (beneficial owners) may enjoy the use and usufruct of natural resources in a sustainable manner, taking into account the cultural diversity of the country and respecting the rights acknowledged in the Autonomy Statute regarding the two regions on the Caribbean Coast, the Upper Wangki and Bocay rivers and the pertaining municipalities (see section 4.5, on the laws regulating the use of natural resources).

- The natural resources in the protected areas are under the stewardship and special administration of the National Protected Areas System (SINAP) at MARENA. According to the law, those who live inside protected areas are to become the real guardians of these state lands. Further, in protected areas the State must ensure the enforcement of the rights and guaranties pertaining to each and every one of the inhabitants, who in turn are subject to regulations regarding the rational use of natural resources. Laws 217 and 462 establish special regulations for management of natural resources in protected areas. For instance, Law 462, section 4 – Protected Areas, article 26 declares that "the forest activities developed in protected areas will

be subject to special regulations." For its part, Law 217 prohibits changing soil use in areas forest vocation.

Activities that take place in protected areas are limited to their classification, according to guidelines for their administration and management plans. The greater the restrictions, the more numerous are the constraints upon owners, holders or usufructuaries. In most protected areas mining, logging and extensive agricultural / cattle-raising activities are prohibited.

1.5.2 Challenges for land use and land rights in the project area[37]

There is no evidence of any significant dispute or conflict based on land use rights in the project area that might in any way endanger the ERPD program. Land titling is clearly defined and communal property receives special protection, as it may not be divided, transferred or sold, nor may rights over possession, use and usufruct of these lands end in time. Any controversy arising from the use and usufruct of communal land can be resolved by resorting to jurisdictional bodies, renegotiating the terms of leasing contracts / agreements or improving the administration of communal property. Clear land titles are the result of significant efforts made by the government of Nicaragua through the National Demarcation and Titling Commission (CONADETI), to demarcate and title 23 indigenous and afrodescendant territories, corresponding to 31.4% of the national territory. Of the 23 titled territories, 16 are located in the RACCN, 4 in the RACCS, and 3 are in the Special Regimen Zone of Alto Wangki and Bocay. They contain 304 communities on a total territory of 3,819,340 ha.

Given the existence of clear land titles, any potential conflicts or claims based on possession or improvement of communal property by non-indigenous, non community members (which the Law calls "third parties") do not have a legal basis. Nevertheless, land use tensions associated with the expansion of the agricultural frontier and changes of use exist due to the following factors:

(i) Exogenous factor or structural economic problems that are related with the pressure of poor migrants in search of better economic opportunities that entail the development of agricultural systems based on extensive land use, and

(ii) Endogenous factors that put into relief weaknesses in territorial land use classification and zoning, contract administration, weak monitoring and control, as well as the harmonization of community and territorial norms and regulations, despite the existence of an adequate legal framework

These factors are associated with the presence of so called "third parties" in some indigenous territories and protected areas where they convert forests to pastures or other crops.

The situation described in the foregoing can be dealt with by resorting to jurisdictional bodies, renegotiating the terms of leasing contracts/agreements or improving the administration of communal property. Among the territories in which there is most conflict regarding land use are Awastigni, Mayagna Sauni Bas (Sikilta), Tuahka, Mayanga Sauni Arungka, Tasba Pri, Wagni Tui Tasba Raya and Rama Kriol.

Lack of clarity of land use agreements with these "third parties", transfers of land between "third parties" and organized incursions of third parties to communal lands can be causes of conflicts.

These conflicts are often caused through following reasons:

- ✓ Illegal purchase and sale of communal lands to third parties;

- ✓ Endorsements given by ex-communal and territorial authorities to third parties;
- ✓ Rental contracts and agreements for communal lands, with rules and areas not clearly stipulated;
- ✓ Illegal and irrational extraction of natural resources, changes in land use toward extensive agriculture and cattle

In order to avoid the risk of intervening in conflictive situation, Bio-CLIMA will only support non-indigenous land ocuppants if these are under a peacefull cohabitation regime "convivencia pacífica" with the respective Indigenous Territory Government. Bio-CLIMA will support and facilitate such arrangement.

1.5.3 Mechanisms for resolving land use tensions

Law 445 includes procedures for protecting the rights of communal lands and resolving land titling conflicts. The latter is the responsibility of the Attorney General of the Republic and CONADETI. This process consists of the following steps: (i) a diagnosis of the situation based on documents and titles; (ii) updating of the legal status of third parties; (iii) research and verification of the registration history of the property; (iv) updating of the land registry; (v) approval of the changes by the Communal or Territorial Assemblies; and (vi) mediation and compliance of third parties with the resolutions.

This process strengthens the titling of communal property and the governance of the same by indigenous and afrodescendant peoples. It is considered as the fifth stage of the process of demarcating and titling indigenous lands. As such, it forms part of gradual legal and social process that facilitates the full exercise of indigenous property rights with respect to other groups of inhabitants.

In addition, Executive Decree No. 15-2013 created the Inter-Institutional Commission for the Defense of Mother Earth in Indigenous and Afrodescendant Territories of the Caribbean and the Alto Wangki-Bocay. The Committee is integrated by the Attorney General of the Republic, the Supreme Court of Justice, the Secretary of the Caribbean Coast, the Commission of Ethnic Affairs of the National Assembly, MARENA, the Family, Adolescence, and Childhood Ministry, the national police, and the army.

The responsibilities of this Commission are:

- To articulate the actions necessary to consolidate the ancestral rights of property in the indigenous territories with the operative territorial entities.
- To adopt the measures jointly agreed upon with the communal and territorial authorities.
- To assist the territorial governments with the execution of recommendations contained in the Committee´s resolutions aimed at confronting the threats to Mother Nature.
- To exercise mediation and attempt to find alternative solutions to conflicts that involve third party occupants of indigenous territories, while maintaining the territorial governments permanently informed of all Committee resolutions.

In parallel, the country is attempting to apply specific regulations and procedures to these conflicts. This process includes:

- Actions to reorder or regularize the public property registries in order to assure the full exercise of the rights of communal property, including the potential indemnification of third parties.

- The recognition of agrarian reform titles emitted before 1987, but under the communal property regimen, i.e. land use by third parties is recognized, but land sales are prohibited except to the community.
- Accelerating the judicial processes involving the demands by third parties to communal properties.
- Mediation and conflict resolution involving groups without legal documents or titles, based on dialogue and consensus.

Recently, various territories have also developed more agile instruments and procedures that establish norms for co-habitation of use of land by third parties. These include:

- ✓ The formulation of norms for co-existence and use of natural resources by third parties,
- ✓ Land rental contracts for third parties,
- ✓ The classification and zoning of land use,
- ✓ Conditioning of land use by third parties on the sustainable use of natural resources and respect for the customs and traditions of the indigenous communities.

In the RACCS, some territories have their own instruments of land and natural use administration. For example:

- ✓ Tawira has norms for fisheries.
- ✓ Wangki Twi Tasba Raya has a norm for the control and use of natural resources,
- ✓ Sauni Arunka has a consultation protocol.
- ✓ AMASAU has a regulation for communal property governance and a plan for land use classification and zoning, within the autonomous community framework.
- ✓ The Rama y Kriol and Karatá territories have approved norms that regulate the co-habitation and use of property with other ethnic groups.

It should be noted that since many of the third parties that are present in indigenous territories have lease or rental contracts or other legal instruments that allow them to use the land in certain areas, the strengthening of the capacities of the territories and communities to administer these relations plays a very important part of the strategy for promoting sustainable land use in the face of land use pressure. These measures need to harmonized and aligned with the national legal framework and on the other hand there is a strong need to support indigenous and afro-descendant territorial authorities to reach agreements of land use and usufruct with these third parties. Bio-CLIMA will actively support both processes.

2 Climate change scenarios and impacts

2.1.1 National baseline emissions (Third National Communication and ER-PD)

While in year 2000 the AFOLU sector accounted to nearly 92% of Nicaraguas´ GHG emissions, sectoral contribution has been reduced steadily to reach 68% in 2010 most of it still being generated through

loss of forest. Both CH4 and N2O emissions increased by 36% between years 2000 to 2010 to 6,492 and 2,252 GgCO2eq, respectively, mainly from the enteric fermentation of livestock (41%) and the management of agricultural soils (47%) .

2.1.2 Vulnerability

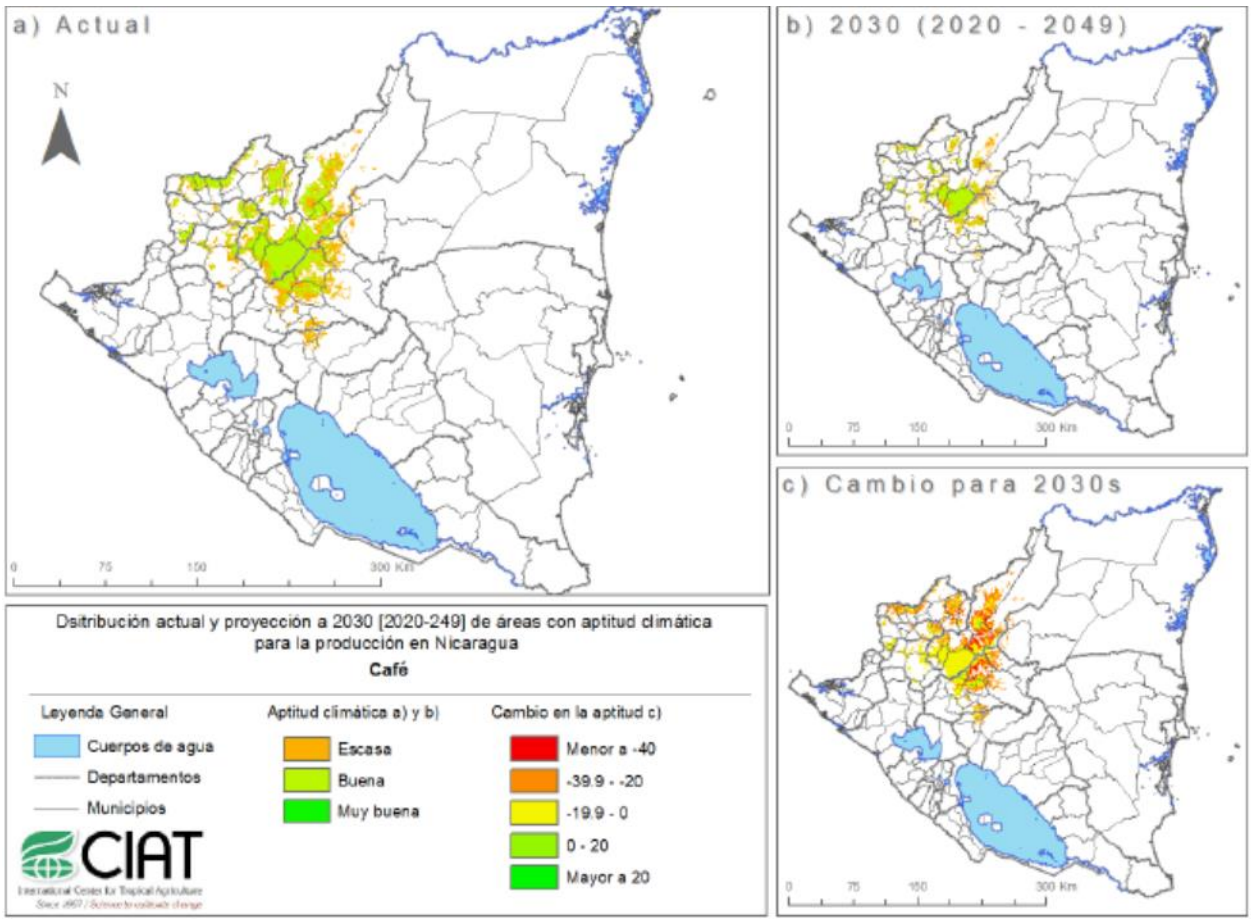
Due to Nicaragua´s geographic position the country is highly exposed to frequent climatic shocks produced by excessive precipitation (hurricanes and tropical depressions) and droughts of varying intensities, sometime associated with the El Niño Southern Oscillation (ENSO). Events that were declared natural disasters occurred in 1982, 1988, 1996, 1998, 2001, and 2014, primarily hurricanes and tropical storms that caused damage to infrastructure, displaced people from their homes, and produced losses to the agriculture sector. Recently, in November 2016 Hurricane Otto hit the Río San Juan Biosphere damaging and defoliating severely 22% of the area. In 1998 Hurricane Mitch caused losses of US$1,3 billion, of which US$ 244.6 million was in the agriculture sector. In contrast, in 2001, one of the most severe droughts on record caused losses of US$49.1 million, of which US$41.4 was in agriculture[38]. Many of the 162,000 people who suffered significant of total damages from Hurricane Felix in 2007 have not yet recovered[39].

Nicaragua is within the ten most vulnerable countries and ranks 6th in the Climate Risk Index rank from 182 countries[40]. Family farming is particularly vulnerable to climate risk: it encompasses the vast majority of producers in number, land holdings, and agricultural production. In number, family agriculture incorporates 98 percent of all producers. In land area, family farming comprises 90 percent of agricultural land. In agricultural production, their output value comprises 89 percent of the total. Their relevance for food security is irrefutable. Family farms contribute an estimated 60 percent of agricultural GDP from production of basic grains (maize, rice, beans, and sorghum) and livestock41.

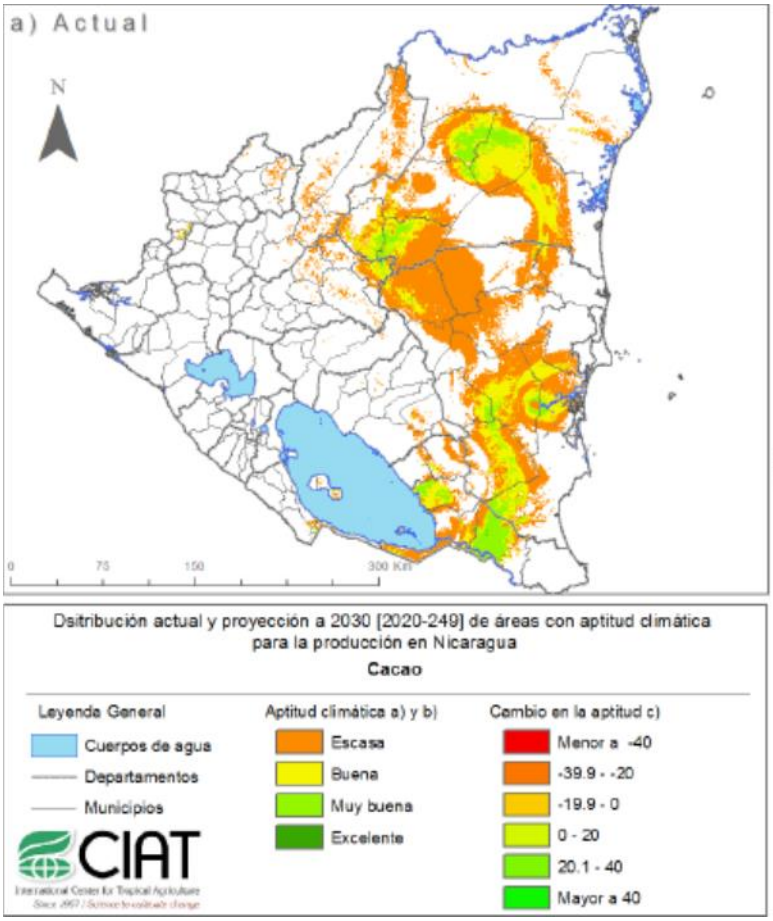
2.1.3 Risks and opportunities for agriculture in a changing climate

In BOSAWAS the landscape is flat to undulating. Most of the area, 60%, has an altitude of under 100 masl, 30% between 100 to 600 masl and 10% over 600 masl with the highest point at 1650 masl. The climate is humid, with a prolonged rainy season from May to January and a dry season from February to April. Annual rainfall varies between 1,800 and 2,800 mm, some places reaching 3,200 mm. Soils have a high clay content and are prone to waterlogging, with high aluminium content and therefore generally of poor fertility. In the Region of the Indio Maíz Biological Reserve in southeastern Nicaragua the annual rainfall exceeds 5000 mm during 11 months, with only March and April as relatively dry months. Rainfall in the buffer zone varies between 2300 and 2800 mm annually.

As just described, the climate in the CR characterized by apparently enough rainfall and a sub-tropical per-humid climate. Nevertheless, future climate scenarios42 foresee a temperature rise of 0.7 ºC for the period 2010-2039 in the CR, an increase in number of days were maximum temperature surpasses 35 ºC and an increase of 10% in dry days. The rates of temperature increases are significantly higher in deforested areas, more than 50% higher than average temperature changes in tropical areas43. These changes will affect the suitability of the main crops that support rural livelihoods in the CR, especially livestock and coffee. As temperatures increase above the current suitability range (18–28 °C) for coffee, cocoa cultivation will be a promising alternative crop with higher heat tolerance within agroforestry systems44.



Current (a), future (b) and changes (c) in suitability for coffee (above); and cocoa (below): Dark green colors in (a) and (b) express excellent, light green means very good, yellow means good and orange means low suitability. While changes in suitability (c) are expressed in a color ramp from red (less than 40%) to green (more than 20%)


a) Actual
N
0
75
150
300 Km
b) 2030 (2020 - 2049)
0
75
150
300 Km
c) Cambio para 2030s
0
75
150
300 Km
Dsitribución actual y proyección a 2030 [2020-249] de áreas con aptitud climática para la producción en Nicaragua
Cacao
Leyenda General
Cuerpos de agua
Departamentos
Municipios
CIAT
Aptitud climática a) y b)
Escasa
Buena
Muy buena
Excelente
Cambio en la aptitud c)
Menor a -40
-39.9 - -20
-19.9 - 0
0 - 20
20.1 - 40
Mayor a 40

3 Relevant policy and legal framework

Nicaragua has a relatively solid legal framework which is rooted in the Political Constitution of Nicaragua (CN). It establishes the responsibility for a healthy environment, the protection of the natural resources, the recognition and protection of the different property regimes, the recognition of the communal property of the indigenous and afro-descendant communities, promotion of sustainable economic development in harmony with Mother Earth, the recognition of the use, enjoyment and benefit of the natural resources, ownership by the forest by its owners and the autonomy of the Autonomous Regions of the Caribbean Coast.

The country's environmental Legal Framework is underpinned by articles 60 and 102 of the CN and is a robust legal framework as it has been sustained since 1996 under the principles of Environmental Law mandated in international instruments ratified by Nicaragua and has created special laws that regulate the forest, protected areas, biodiversity, water, land and other issues under the sustainable development focus.

3.1 Political Constitution of Nicaragua:[45]

Recognizes the importance of the State in environmental protection and of the services provided by the forests and their ecosystems, which represent a juridical strength for the implementation of ENDE-REDD+. The State has a regulatory and normative role, is a guarantor of the application of the laws, decrees, resolutions, ordinances, programmes, policies, public policies and strategies on environmental and forestry issues.

The analysis of the articles of the Political Constitution linked to ENDE-REDD+ is presented in the following chart.

Political Constitution	Constitutional scope
Art.2	Direct participation of the people in national affairs.
Art. 5	Recognition of the original and Afro-descendant peoples, forms of social organization, administration of local affairs, maintenance of their communal forms of property and the enjoyment, use and benefit of the natural resources.
Art. 8	The Nicaraguan people is of a multiethnic nature.
Art. 44	Recognition of the different types of property that must fulfil a social function.
Art. 60	Right to live in a healthy environment.
Art. 89	Right of the peoples of the Caribbean Coast to preserve and develop their identity, recognition of their communal forms, and enjoyment, use and benefit of the waters and forest.

Art. 102	The natural resources are national assets, granting concession contracts for natural resources when he national interest requires it.
Art. 103	The State guarantees the forms of property; legal dominion and possession is not perturbed except in cases in which the laws on the issue permit.
Art. 180	Use, enjoyment and benefits of the natural resources as an inalienable right of the Caribbean Coast Communities.
Art. 181	Autonomous regime in which the concessions and contracts granted by the State require the approval of the Regional Council.

Article 60 of the Constitution establishes the fundamental right of all Nicaraguans to live in a safe environment and their obligation to preserve and conserve it. In the recent reform,[46] elements were incorporated directed *"…to the care of Mother Earth as the supreme and universal common good, subject of dignity, which must be loved, cared for and regenerated. Making a call to protect and restore the integrity of the ecosystems, with special concern for the biological diversity and for all natural processes that sustain life. The Nicaraguan nation must adopt production and consumption patterns that guarantee the vitality and integrity of Mother Earth…"*

Through the Constitution the Nicaraguan State assumes and integrates the Universal Declaration of the Rights of Mother Earth. It conducts the State to promote productive activities in a sustainable manner, ensuring the vitality and integrity of Mother Earth. In this regard, environmental care is associated with the permanence and sustainable benefits of the natural resources compatible with the development of the country and the needs of its population.

With respect to control of the natural resources, article 102 of the CN establishes that "The natural resources are national assets. The preservation of the environment and the conservation, development and rational exploitation of the natural resources correspond to the State; it can grant contracts for the rational exploitation of these resources when the national interest requires it under transparent and public processes…."

Finally, the ENDE-REDD+ must guarantee what is laid out in article 98 of the CN.: "The main function of the State in the economy is to achieve the country's sustainable development, improve the people's living conditions and realize an increasingly fair distribution of the wealth in the search for good living."

3.2 International commitments and NDCs

Below is a list of the treaties, conventions and declarations ratified by Nicaragua that are relevant to the implementation of ENDE-REDD+:

Universal Declaration of the Common Good of the Earth and Humanity	The Universal Declaration of the Common Good of the Earth and Humanity is part of our Political Constitution of Nicaragua. The declaratory section stresses that "the climates belong to the Common Good of Mother Earth and of Humanity because they are the essential condition of the maintenance of life and climate changes must be treated globally and with a shared responsibility."
United Nations Framework Convention on Climate Change (UNFCCC).	Nicaragua signed and ratified the United Nations Framework Convention on Climate Change (UNFCCC), the objective of which is to "achieve, in accordance with the relevant provisions of the Convention, stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system." (UN, 1992, Article 2). Nicaragua recognizes the importance of directing actions aimed at actively and concertedly participating in the international community's efforts to ensure stability in the world's climate.
Kyoto Protocol, approved by the National Assembly via Legislative Decree No. 2295, July 1, 1999, published in *La Gaceta, Diario Oficial*, No. 133, of July 13, 1999.	The Protocol constitutes a historic first step to control greenhouse effect gases, offering a basic framework of action in the struggle against climate change. The protocol obliges many industrialized countries to implement the policies and institutions needed to reduce emissions, although its impact on the rising tendency of emissions has been very limited. In 2014, Nicaragua noted that "what we need is a legally binding instrument that recognizes the different degrees of development, as well as responsibility and differentiation with respect to who causes and who is suffering the consequences of this phenomenon. This agreement contains obligatory commitments to reduce greenhouse gas emissions and also financial commitments, technology transfer and the strengthening of the capacities of the developing countries."

Convention on the International Trade in Endangered Species of Wild Fauna and Flora (CITES).	Nicaragua has signed and adopted CITES, assuming the commitments to see to it that the international trade in wild animal and plant specimens does not constitute a threat to their survival. Law 217 establishes an annual off-season that seeks to ensure the protection of endangered species at risk of extinction.
RAMSAR.	Inter-governmental treaty that offers the framework for the conservation and rational use of wetlands and their resources.
Convention 169 "Indigenous and Tribal Peoples Convention"	ILO Convention 169 was ratified by Nicaragua in 2010. It is the only binding international instrument that specifically addresses the rights of indigenous peoples.
UN Declaration on the Rights of Indigenous Peoples.	Another instrument ratified by Nicaragua is the UN Declaration on the Rights of Indigenous peoples, which, though it does not have the status of a convention or treaty, i.e. does not involve binding or obligatory compliance by its signatories, the
	National Assembly assumed in 2010 the commitment to promote actions that take up the juridical premises of that Declaration to adjust the national normative frameworks to it.
International Convention on the Elimination of All Forms of Racial Discrimination (CERD)	The International Convention on the Elimination of All Forms of Racial Discrimination was approved by the UN General Assembly in 1965 and went into effect in 1969. This Convention is based on the principle of dignity and equality of all human beings, and that all have the same human rights and fundamental liberties, without distinction for reasons of race, language, sex, religion or nationality
Convention for the Elimination of All Forms of Discrimination against Women (CEDAW).	International juridical instrument approved by the States that commits them to a serious of obligations regarding women. Nicaragua ratified the CEDAW agreements on September 3, 1981.

Protocol of Montreal.	International agreement that limits, controls and regulates the production, consumption and trade in substances that despoil the ozone layer.
Stockholm Convention on Persistent Organic Pollutants.	The Stockholm Convention was created to protect human health and the environment against the damages caused by COPs. It was signed by Nicaragua in May 2001 and ratified in July 2005.
Sustainable Development Goals (SDG).	The SDGs are an inclusive agenda with defined goals for 2010. They address the fundamental causes of poverty and unite to achieve a positive change on behalf of persons and the planet.

In its NDCs[47] Nicaragua proposes to implement following concrete measures in the AFOLU sector: i.) Encourage agro-ecological production of permanent crops under tree shade, more resilient to the impacts of CC, ii.) Reduce extensive cattle grazing and introduce sylvo-pastural systems, iii.) Establish planted forests on idle or degraded forest land, prioritizing the use of natural regeneration of native tree species, iv.) Extend the use of bio-digesters, v.) Restore and conserve ecosystems and ecosystem services, taking advantage of adaptation and mitigation synergies, with special emphasis on watersheds management and risk reduction, as conservation of biological diversity and protected areas. Through these measures, which will be implemented also by Bio-CLIMA, Nicaragua offered to raise its carbon absorption capacity by 20% in relation with the reference scenario to 2030[48].

Following priority measures to improve the countries capacity to adapt to CC are listed in the NDCs and will be implemented by this Project: i.) Modernization of hidro-meteorological services to produce relevant climate information and early warning alerts[49], ii.) Raise the efficiency for the protection of the biosphere reserves through land-use-planning and reforestation, iii.) Cooperation to strengthen capacities in climate finance, iv.) Capacity development, access to technologies and finance for the agricultural sector, and v.) Implement programmes to manage prioritized ecosystems in a resilient way through a landscape approach.

3.3 National policies and strategies

Bio-CLIMA is fully aligned with the National Human Development Plan 2018-2021[50] and the National REDD+ Strategy, and will directly implement following four (out of seven) strategic lines of action of the National Climate Change Mitigation and Adaptation Policy[51]: Nr. 1. ”Development of agriculture that is resilient to actual climate variability and future climate change, with actions that favour low GHG emissions”; Nr. 5. “Use and conservation of ecosystem services to achieve low-carbon sustainable development that is adapted to climate change”, Nr. 6. ”Conservation, restoration and rational use of forests, as the promotion of planted forests in forest land-use zones” and Nr. 7. ”Promote knowledge, research, finance and information about climate change mitigation and adaptation, as the modernization and strengthening of alert and early-warning systems”.

3.4 Synthesis of the relevant legal framework

Nicaragua has been transforming its laws since the 1990s, with an orientation to the protection, conservation and sustainable use of the natural resources as assets of the nation. Below is the legal framework related to ENDE-REDD+

Legal framework in effect	
Law 28, Law of the Autonomous Regime of the Caribbean Coast and its regulations, Decree No. 3584. Text of Law No. 28 "Statute of Autonomy of the Regions of the Caribbean Coast of Nicaragua with its incorporated reforms. Law No. 28, approved on July 29, 2016. Published in *La Gaceta* No. 155 of August 18, 2016.	It establishes the norms and regulations of the Caribbean Coast autonomous region and recognizes the rights and duties corresponding to its inhabitants in conformity with the Political Constitution of Nicaragua.
Law No. 40 and its regulations. Text of Law 40, Law of Municipalities with reforms and incorporations. *La Gaceta Diario Oficial* No. 06, published January 14, 2013.	The law that regulates the municipality as the basic unit of the country's political-administrative division, regulates its territory and natural resources in coordination with other authorities, the local affairs of its circumscription, recognizes the existence of the indigenous communities located in its territories, whether legally constituted or de facto, according to the dispositions of the Law of Indigenous Communities of 1914, 1918, Law 445 and other laws.
Law 217, General Law of the Environment and Natural Resources. Approved on March 27, 1996, published in *La Gaceta* No. 105 of June 6, 1995 and is regulations Decree 9-96. Text with reforms and incorporations published in *La Gaceta Diario Oficial* No. 20 of January 31, 2014.	General Law of the Environment and Natural Resources has the objective of establishing norms for the conservation, protection, improvement and restoration of the environment and natural resources that make it up, assuring their rational and sustainable use in accord with what is stated in the Political Constitution. Article 18 of Law 217 created the National System of Protected Areas. Nicaragua has been advancing satisfactorily in updating, adjusting and modernizing its laws; in 2004 it considered important reforms to Law 217,[52] which incorporate the issue of climate change.

Law 274, Basic Law for the Regulation and Control of Pesticides, Toxic, Dangerous and Other Similar Substances, approved on November 5, 1997, published in *La Gaceta* No. 30 of February 13, 1998, and the regulations	The law establishing the basic norms for the regulation and control of pesticides and toxic, dangerous and other similar substances as well as determining the institutional competency to that effect and ensuring the protection of sustained agricultural activity, human health, the natural
for Law 274, Decree 49-98, approved on June 26, 1998. Published in *La Gaceta* No. 142, of July 30, 1998.	resources, safety and hygiene of labour and the environment in general to avoid the damage these products could cause due to their improper selection, management and poor use.
Law 290, Law of the Organization, Competence and Procedure of the Executive Branch and Law 929, Law of Reforms and Additions to Law 290. Law No. 929 reforms Law No. 290, Law of the Organization, Competence and Procedure of the Executive Branch and Law 462 on conservation, fostering and sustainable development of the forestry sector, published in *La Gaceta Diario Oficial* No. 97, of May 25, 2016.	It determines the organization, competence and procedures of the Executive Branch (MARENA, MAG, INAFOR, MEFFCA, etc.).
Law 445, Law of the Communal Property Regime of the Indigenous Peoples and Ethnic Communities of the Autonomous Regions of the Caribbean Coast of Nicaragua and of the Bocay, Coco and Indio Maíz Rivers. Published in *La Gaceta* No. 16 of January 23, 2003.	Regulates the communal property regime of the lands of the indigenous peoples and ethnic communities of the Caribbean Coast and the basins of the Coco, Bocay and Indio Maíz rivers.

Law 462, Law of the Conservation, Fostering and Sustainable Management of the Forestry Sector and its reforms. Approved June 26, 2003, published in *La Gaceta*, *Diario Oficial* No. 168 of September 4, 2003. Law with substantial reforms contained in Law 929, *La Gaceta*, *Diario Oficial* No. 97 of May 25, 2016.	Since 2003 the country has had a modern legal forestry framework whose objective is to regulate and promote the conservation, fostering and sustainable development of the forestry sector through Law 462,[53] taking as a fundamental base the forestry management of the natural forest, the fostering of plantations and the protection, conservation and restoration of forested areas. Law 462 stresses the importance of improving the standard of living of the population through forest management and giving participation to the municipal governments and civil society to oversee the conservation of the resource, assuring the multiple benefits in goods and services produced by forests. In relation to ownership of the land and its diverse forms of tenure, Law 462 expressly defines that the
	owner of the soil has dominion over the forest cover existing above it, and of the benefits derived from it, being responsible for managing it in accord with the law and its regulations
Ley 475, Law of Citizen Participation. Approved on October 22, 2003. Published in *La Gaceta* No. 241 of December 19, 2003.	The objective of the law is to promote the full exercise of citizenship in the political, social, economic and cultural spheres through the creation and operation of institutional mechanisms that permit fluid interaction between the State and Nicaraguan society, contributing with that to the strengthening of liberty and participatory and representative democracy established in the Political Constitution of Nicaragua.
Law 757, Law of dignified and equitable treatment of Indigenous and Afrodescendant Peoples. Approved on March 2, 2011. Published in *La Gaceta* No. 96 of May 26, 2011.	Its objective is to regulate and ensure the fair and egalitarian treatment of the Indigenous and Afrodescendant Peoples of the Caribbean Coast and Upper Wangki of Nicaragua, as well as of the indigenous peoples of the Central and North Pacific of Nicaragua with respect to opportunities and access to work in the public and private sector and nongovernmental organizations with all the rights, guarantees and benefits established in the labour laws, international conventions signed and ratified by Nicaragua, and other related dispositions.

Law 765, Law of Promoting Agroecological or Organic Production. Published in *La Gaceta*, *Diario Oficial*, No. 124 of July 5, 2011, and its regulations.	This is a law aimed at production under three major dimensions: social, economic and environmental. Its objective is to foster development of agro-ecological or organic production systems through the regulation, promotion and push to production activities, practices and processes with environmental, economic, social and cultural sustainability that contribute to the restoration and conservation of the ecosystems and agroecosystems, as well as sustainable land management.
Law 805, Law of Conservation and Sustainable Use of the Biological Diversity, October 19, 2012.	Its objective is to regulate the conservation and sustainable use of the existing biological diversity in the country, ensuring equitable participation and fair distribution of the benefits derived from its use with special attention to the indigenous and Afrodescendant communities and respect for and recognition of intellectual property rights, and traditional and customary use forms of the local communities
Decree 01-2007, Regulation of the Protected Areas of Nicaragua, approved on January 8, 2007. Published in *La Gaceta* No. 08 of January 11, 2007.	Nicaragua has a National System of Protected Areas (SINAP), whose purpose is to protect the country's natural resources; preserve natural ecosystems representative of the country's diverse biogeographical and ecological regions; protect hydrographic basins, aquifers, samples of biotic communities, genetic resources and the genetic diversity of wildlife flora and fauna; protect natural landscapes and the surroundings of historic archaeological and artistic monuments; promote local sustainable development promoting the implementation of clean processes and technologies for the improvement and rational and sustainable use of the natural and potential ecosystems and systemically strengthen the environmental services that the protected areas provide for the benefit of the area's inhabitants, the national economy and sustainable development. SINAP produces various environmental services: carbon capture, water and soil protection, connectivity and conservation of biodiversity.

Decree 76-2006, Environmental Evaluation System, approved December 19, 2006. Published in *La Gaceta* No. 248 of December 22, 2006.	The objective of Decree 76-2006 is to establish the dispositions that regulate the Evaluation System, which is made up of the Strategic Environmental Evaluation and the Environmental Evaluation of Works, Projects, Industries and Activities. Environmental Evaluation is used as an instrument for preventive management with the aim of identifying and mitigating possible environmental impacts of plans, programmes, works, projects, industries and activities in conformity with the decree, and includes the preparation of studies, holding of public consultations and access to public information for decision-making that concludes with the authorization and/or denial by the competent authority (MARENA, SERENA and municipal governments).
Law 759, Law of Traditional Medicine, approved March 29, 2011 and published in *La Gaceta*, *Diario Oficial*, No. 123 of July 4, 2011, and its Regulation, Decree	It recognizes, respects, promotes and protects the practices and knowledge related to traditional medicine. It also seeks to protect the knowledge of collective intellectual property. It protects and
No. 25-2014, published in *La Gaceta*, *Diario Oficial*, No. 85 of May 12, 2014.	promotes the use of natural medicines based on plant, animal and mineral derivatives or any combination of them, in conditions of quality, safety, accessibility and responsibility.

3.5 Specific legislation protecting the rights of Indigenous and afro-descendant People

Political Constitution of Nicaragua: the State of Nicaragua first recognized the multiethnic nature of the country when its new Political Constitution was issued in 1986. It acknowledged the existence of Original and Afro-descendant Peoples and their right to maintain and develop their own identity, culture and organization. It also recognized their right to communal ownership of the land and established the Autonomy regime for the Caribbean Coast,[54] recognizing the full rights of the indigenous and afro-descendant peoples of the Caribbean Coast to the ownership, use and administration of their natural resources and management of their communal lands under their different forms. These rights are granted through articles 5, 79 and 180 of the Political Constitution.

Law 28 of Autonomy of the Regions of the Atlantic Coast of Nicaragua: Known as Autonomy Regime. It establishes the effective participation of indigenous and afrodescendant peoples in the development affairs of the region to harmonize them with the interests of the Caribbean Coast Communities. Article 8.4 states "Promote the rational use, enjoyment and benefit of the waters, communal lands and defence of their ecological system" and 8.5 "The study, fostering, development, preservation and dissemination of the traditional cultures of the Atlantic Coast Communities, as well as their historical, artistic, linguistic and cultural heritage must be promoted."

The governance platform of the indigenous territories is regulated by a very solid structure of traditional communal authorities who play a fundamental role in administering the natural resources in general.

Ley No. 445[55], Law of Communal Property Regime: It refers to the Indigenous Peoples and Ethnic Communities of the Autonomous Regions of the Atlantic Coast of Nicaragua (today called Autonomous Regions of the Caribbean Coast) and of the Bocay, Coco, Indio and Maíz Rivers.. It guarantees the indigenous peoples and ethnic communities full recognition of the rights of communal property; the use, administration and management of the traditional lands and their natural resources via their demarcation and titling; regulates the rights of communal ownership, use and administration of the natural resources on the communal lands; and determines the legal procedures necessary for that recognition.[56]

The Law acknowledges and promote their participation through their traditional leaders and establishes the basic principles of the administrative regime in the management of their communal territories. It establishes the norms and procedures for the demarcation and titling process over the communal property right and defines the institutional order that will govern the titling process for the communal lands of each of the different indigenous peoples and ethnic communities.

As of 2016 the National Demarcation and Titling Commission (CONADETI) has titled 23 indigenous and afro-descendant territories covering an area of 37,252.91 km^2, which represents approximately 54.7% of the Caribbean Coast and is equivalent to 31% of the national territory.

Law No. 162 on the official use of the languages of the Caribbean Coast communities of Nicaragua establishes that they have the right to the preservation of their languages.

This law also mandated that the State of Nicaragua will establish special programmes for the exercise of this right and will provide the resources.

Law 759 on traditional medicine seeks the recognition of the right to, the respect for, and the protection and promotion of practices and expressions of ancestral traditional medicine of the indigenous and afro-descendant peoples.

Convention 169: This convention is based on recognition of the aspirations of the indigenous and tribal peoples to take control of their own institutions, forms of life and economic development, and to maintain and strengthen their identities, languages and religions within the framework of the States in which they live. To comply with this Convention two essential elements must be taken into account: the first of them is free, prior and Informed Consent (FPIC) , which means that a community cannot reflect and make decisions on a specific topic if it lacks sufficient information, which must be clear, objective, true and sufficient, and the consent must be free of any pressure. The second element is the sphere of the consultation, which must be previously agreed to with the community and defined whether it is at the level of organizations or a plebiscite with the general community, which will obviously depend on the impact, sector and dimension of the activity to be developed. The transcendental aspect of this right is that it respects the community's decision of who can freely accept or reject any proposal based on whether or not it is considered suitable.

Therefore the execution of ENDE-REDD+ and all the programmes and projects that implement it, like Bio-CLIMA will be based on the respect for the organization of the original peoples, who have traditional leadership through their Communal Assemblies, Councils of Elders, Community Boards of Directors,

Síndicos (community representatives in charge of natural resources), *Wihtas* (Communal Judges), Territorial Governments and others in charge of representing their territories for decision-making on issues that involve their lands and natural resources.

4 Institutional setting[57]

4.1 National level

4.1.1 The Ministry of the Environment and Natural Resources (MARENA)

MARENA is the national lead authority of the country's environmental policy,[58] administers the National System of Protected Areas (SINAP), the National System of Environmental Information (SINIA) and the Environmental Evaluation System; regulates and authorizes the sustainable use of agricultural and forest land and is responsible for enforcing environmental crime through an administrative procedure.

Its main inter-institutional coordination are with the following entities:

- The Environmental Evaluation System is decentralized in the Caribbean Coast Autonomous Regions and is the responsibility of the Secretariat of Natural Resources (SERENA) of each autonomous region, which coordinates with MARENA.
- Coordination with the Ministry of Agriculture and with the National Forestry Institute in sectoral planning and sustainable use policies for agricultural, livestock and forest land use.
- Coordination with the authorities of the Attorney General's Office, Prosecutor General's Office, National Police and Army of Nicaragua for the protection, surveillance and control of the protected areas.

MARENA is the Executing Entity for the National REDD Programme (ENDE-REDD+) and as such responsible for the execution of the ERP and the Bio-CLIMA Project, which also involves following matters:

- The National Forest Monitoring System, which processes and provides information on national indicators of forests, non-carbon benefits (Hydric Resources, Biodiversity and Food Security) and Information on REDD+ Safeguards.
- Information generation and monitoring related to biodiversity, ecosystems (protected areas), species, GHG emissions, deforestation hot-spots and land uses.
- Issueing official data on deforestation and forest cover at a national level.
- Quantifying the amount of emissions and/or absorptions through annual recovery or loss of forest cover.

4.1.2 National Forestry Institute (INAFOR)[59]

The INAFOR is the national authority that formulates forestry policy and norms; supervises the forest incentive programmes; reports on the forestry sector; surveils, regulates and controls the sustainable use of the nation's forestry resources, inspection and enforces forest law and issues administrative sanctions outside of protected areas. Surveillance and control is done through coordination with other authorities (municipal governments, SERENA, MARENA, National Police and the Army).

In the framework of the implementation of the ENDE-REDD+ INAFOR is be responsible for:

- National Forestry Inventory, which will be administered by INAFOR through the Division of National Forestry Inventories, a division responsible for providing information about the state of the forests and the biomass. The data generated will permit the calculation and updating of the national emission factors. Within Bio-CLIMA INAFOR will be in charge of following activities

- Promoting reforestation programmes through the administration of the National Forest Fund FONADEFO, specifically evaluate the Community based Sustainable Forest Management and Restoration Projects (CSFM) projects to be put forward by the communities

- INAFOR field personnel to be trained in community forest management and create capacities at the local level

- Oversee and evaluate the CSFM Project in order to inform the Project Steering Commitee

4.1.3 National Institute for Agricultural Technology (INTA)

INTA has the mandate to develop and to spread innovative agricultural technologies and seed to promote the sustainable development of the agricultural sector and grant national food security. INTA has been especially successful in promoting a farmer field school scheme, the "Fincas de Innovación e Investigación Agropecuarias" (FIIA) through which farmer families, selected for their interest to innovate and lead on innovation in their communities, partner with INTA to try new species and approaches and if successful, act as extension agents in their community together with INTA´s technicians.

Within Bio-CLIMA INTA´s role will be:

- To include it extension workers and field personell in the training and capacity building efforts in order to make them acquainted with the new comprehensive approach of production and conservation to be introduced by LUMP, TDP, business plans and the productive landscape restoration models

- INTAs´extensionists and field workers will together with the FAO train service providers and extensionists from the organizations that will be sub-contracted by the silvopastural and agroforestry Trust Funds to implement land use plans, landscape restoration and forest conservation models

- Oversee and evaluate the work carried out by these sub-contractors and report to the project Steering Committee

4.1.4 The Nicaraguan Institute of Territorial Studies (INETER) [60]

Is the institution in charge of the research, inventory and evaluation of the country's physical resources, executing the territorial planning studies, regulating and conducting the cartographic and geodesic work; and regulating, operating, updating and executing the national physical cadastre.

In the framework of the implementation of the ENDE-REDD+ programme, INETER will be responsible for:

- Manage land use and forest cover data to inform the monitoring system, which it is administered by INETER. It provides the geospatial data and "activity data."

- Quantifying the annual amount of emissions and/or absorptions by livestock or forest cover loss through the application of the IPCC guidelines.

- Issue official national deforestation and recovery data.

4.1.5 The Ministry of Agriculture (MAG)

Formulates agricultural development policies, plans and strategies. It proposes the delimitation zones, areas and limits for agricultural development. It formulates proposals and coordinates with MARENA the ecological system protection programmes with emphasis on soil and water conservation.

In the framework of the implementation of the national ENDE-REDD+ programme MAG will be responsible for:

- Prepare the SNMRV protocols in coordination with the other institutions.

- Draft production protocols with an environmental focus for the categories related to ENDE-REDD+.

4.1.6 Ministry of Family, Community, Cooperative and Associative Economy (MEFCCA)

Has the mandate to promote and develop the rural and urban family economy through socio-productive plans, programmes and strategies (food security, tourism, gastronomy, handcrafts and family agricultural production). It provides technical assistance, promotes the use of basic agro-industrial technologies and processes, fosters small businesses and participates in socio-productive programmes together with the Secretariat of the Caribbean Coast and Governments of the Caribbean Coast. It also supports the implementation of the development plans in the indigenous, mestizo and Afro-descendant territories.

In the framework of the implementation of the national ENDE-REDD+ programme, the MEFCCA will be responsible for:

- Support the development of productive projects that give value to the forest and ensure good environmental practices.

- Supporting the agro-ecological transformation of traditional farms for their adaptation to climate change.

4.1.7 Ministry of the Treasury and Public Credit (MHCP)

Administers public finances; defines, supervises and controls the fiscal policies; formulates the policies, norms and procedures for the preparation of the public budgeting, programming and execution. The MHCP consolidates and proposes the General Budget Bill to be issues by the President of the Republic; administers the State Public Investment Record (RIPE); and organizes and supervises the transfers and disbursements of current and capital financial resources.

In the framework of the implementation of the national ENDE-REDD+ programme, the MHCP will be responsible for:

- Act as Designated National Authority to the Green Climate Fund (GCF)

- Identifying and approve financial instruments and sources that will be used in the programme, including the Trust Funds

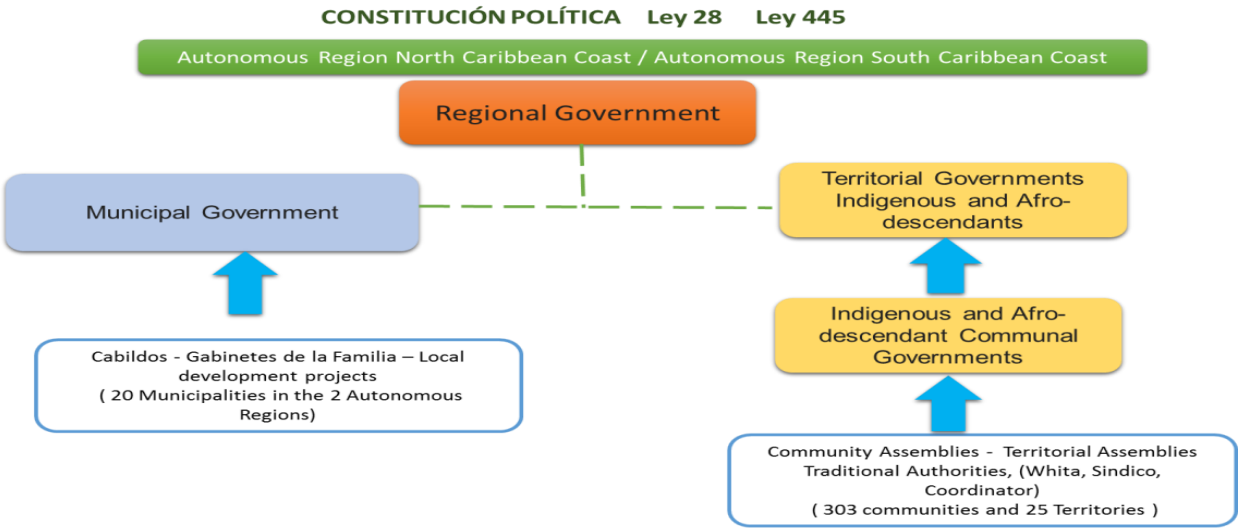
- Identifying sources of financing linked to sustainable development.
- Assure the transfers of the payments.

4.2 Regional and local level

4.2.1 The Autonomous Governments of the Caribbean Coast

In both Autonomous Regions of the Caribbean Coast (RACC) a system of administration coexists that is structured by the following levels of authority: The Autonomous Regional Governments, the Municipal Governments, the Territorial Governments and Communal Governments, as shown in following figure:

Scheme of administration of the Autonomous Regions of the Caribbean Coast



The Regional Government participate effectively in the drafting and the execution of regional development plans and programs, as well to manage and to promote the rational use and usufruct of bodies of water, forests and communal lands, and the defense of Its ecological system. Their Regional Councils issue resolutions and ordinances on the issues of their competency in the region; participate in the planning, implementation and follow-up of the economic, social and cultural policies and programmes that affect their region; approve through resolution the exploitation of the natural resources in the region. Both regions have a Secretariat of Natural Resources (SERENA) that oversees the sustainable management of the natural resources in each region and administers the National Environmental Evaluation System.

In the framework of the implementation of the national ENDE-REDD+ programme, the Autonomous Governments of the Caribbean Coast are responsible for implementing ENDE REDD+ in coordination with the central level.

4.2.2 Territorial Governments (GTI)and Communal Authorities

According to Law 445, they are the representation with administrative and traditional government bodies that represent the communities that elect them according to their customs and traditions. The territorial authorities or Indigenous Territorial Governments (GTI) are administrative bodies of the territorial unit that they represent. For governance, the GTIs have Ecological Statutes and Norms that help regulate and administer the resources. Inside the communities, the maximum authority is the Communal Assembly, which elects their president "*Síndico*" and their communal judge "*Wihta*", who are designated to administer the natural resources. In addition, pastors, teachers, nurses and midwives are figures who are generally consulted by the communities on issues of communal interest.

The GTI structure is in charge of representing a set of communities. Its board of directors is made up of delegates for decision-making in the affairs that involve their lands and natural resources and they are involved in implementing the ENDE REDD+.

The implantation of the ENDE REDD+ is based on recognition of and respect for the organization of the autonomy regime and of the original peoples, who have their own traditional leadership. The structure of territorial power starts with the Communal Assembly, which may be advised or counselled by the Council of Elders and has a Communal Board of Directors. Within that board are two very important figures related to the management or administration of the community's resources, which are the *Síndico* and the communal judge, or *Wihta*. [61]

4.2.3 The Municipal Governments

They have competence in all affairs that affect the socioeconomic development and the conservation of the environment and natural resources of their territorial circumscription, which is excercised mostly in their urban and peri-urban zones. The have the duty and right to resolve, under their responsibility, the provision and management of all affairs of the local community within the framework of the Political Constitution and other laws of the Nation. The economic resources for the exercise of these competencies will originate in their own income and in those transferred by the Government, through the transfer of either taxes or financial resources.

4.2.4 Private and non-governmental actors

The producer associations in the livestock and cocoa sector are being extensively described in the specific feasibility studies for cocoa agroforestry production and livestock for the Bio-CLIMA Project.

The Yellow Pages of Agricultural, Agroforestry, Livestock and Fisheries Professional of the Caribbean Region[62] contains 74 pages with names and contact of proffesionals and service providers in the Region.

4.2.5 List of institutional actors by municipality in the RAAN

The following table lists all the institutions and social actors relevant for the forest conservation sector of the RAAN, by municipality[63]:

	Nombre de la organización	
1.	**Municipio de Waspam Río Coco**	
1.1.Organizaciones Gubernamentales		
1	Alcaldía Municipal	
2	Instituto Tecnológico de Agricultura INTA	
1.2.	**Organizaciones Comunitarias**	
3	Gobierno territorial Indígena" Wangki Twi Tasba Raya	
4	Wangki Maya Río Abajo	
5	Gobierno Territorial Indígena Wangki LI AUBRA	
6	Gobierno Territorial Indígena "LILAMNI Tasbaika Kum"	
7	Gobierno Territorial Indígena Kipla Sait	
8	Gobierno Territorial Indígena Awastingni " AMASAU"	
2.	**Municipio de Puerto Cabezas**	
2.2. Organizaciones Gubernamentales		
9	Instituto Nacional Forestal **(INAFOR)**	
10	Ministerio del Ambiente y Recursos Naturales **(MARENA)**	
11	Ministerio de Agricultura, Ganadería y Forestal **(MAGFOR)**	

	Nombre de la organización	
12	Ministerio de Educación **(MINED)**	
13	Ministerio de Salud (MINSA)	
14	Alcaldía Municipal	
15	Cruz Roja	
16	Centro de Mejoramiento Genético y Banco de Semilla Forestal	
17	Fondo Nacional de Desarrollo Forestal (FONADEFO)	
18	BICU-CIUM	
19	ASOCIACIÓN PARA EL DESARROLLO DE LA COSTA ATLÁNTICA (PANA-PANA)	
20	Desarrollo Indígena con Identidad " INAD"	
21	Defensa Civil	
2.3. Organizaciones no gubernamentales		
22	Rain Rorest/ Alliance	
23	Instituto de Investigación Aplicada y Desarrollo "NITLAPAN"	
24	Japan International Cooperation Agency "JICA"	
25	Fundación para la Autonomía y el Desarrollo de Costa Caribe de Nicaragua FADCANIC	
26	Grupo de Voluntarios Civil "GVC"	
27	Cooperativa de Profesionales MASANGNI R.L	
28	GIZ - MASERENACE	
2.4. Organizaciones Comunitarias		
29	KARATA	
30	Gobierno Territorial Indígena "10 comunidad"	
31	Asociación de Mujeres Indígenas de la Costa Atlántica (AMICA)	
32	Gobierno Territorial Indígena "Tasba PRI"	
2.5. Empresas Comunitarias en aprovechamiento forestal		
33	EMFORKUAKUIL II	
34	TWIUN	
35	STPSA	
36	Naranjal	
3. Municipio de Prinzapolka		
3.1. Organizaciones Gubernamentales		
37	Alcaldía Municipal	
3.2. Organizaciones Comunitarias		
38	Gobierno Territorial Indígena GTI" Prinzu Awala	
39	Gobierno Territorial Indígena "Prinza Auhyaun"	
40	Empresa Forestal Comunitaria "CEPISA"	
4. Municipio de Rosita		
4.1. Organizaciones Gubernamentales		
41	Alcaldía Municipal	
42	Instituto nicaragüense de tecnología Agropecuario INTA	
4.2. Organizaciones No Gubernamentales		
43	Cooperativa COMCAR " R.L	
44	Fundación para la autonomía y el Desarrollo de la Costa Caribe de Nicaragua FACANIC	
4.3. Organizaciones Comunitarias		
45	Gobierno Territorial Indígena TUAHKA	
5. Municipio de Bonanza		
5.1. Organizaciones Gubernamentales		

	Nombre de la organización	
46	ALCALDIA	
47	Ministerio del Ambiente y Recursos Naturales MARENA	
48	Instituto Forestal INAFOR	
49	Bluefields Indian & Caribbean University (BICU)	
5.6.	**Organizaciones no Gubernamentales**	
50	Fundación para la Autonomía y el Desarrollo de la Costa Caribe de Nicaragua FADCANIC	
5.7.	**Organizaciones Comunitarias**	
51	Norteak Madera S.A.	
52	Gobierno Territorial Indígena "MAYAGNA SAUNI WAS"	
6.	**Municipio de Siuna**	
6.1.	**Organizaciones Gubernamentales**	
53	Alcaldía Municipal de Siuna	
54	Batallón Ecológico Siuna - Bosawas	
55	Instituto Técnico de Agricultura (INTA)	
56	Procuraduría General de la República	
57	Instituto de Recursos Medio Ambiente y Desarrollo (IREMADES – URACCAN)	
58	Universidad de las Regiones Autónomas del Atlántico Norte	
6.2.	**Organizaciones no gubernamentales**	
59	Unión de Agricultores y Ganaderos (UNAG)	
60	Instituto para el Desarrollo (IPADE)	
61	Save the Children	
6.3.	**Organizaciones Comunitarias**	
62	Gobierno Territorial Mayagna Sauni Bas	
63	Gobierno Territorial Mayagna Sauni Bu	
7.	**Municipio de Mulukuku**	
7.1.	**Organizaciones Gubernamentales**	
64	Alcaldía Municipal	
65	Policía Nacional Mulukuku	
66	Cooperativa de servicio Múltiples María Luisa Ortiz	
67	Ejercito De Nicaragua " Batallón Ecológico"	
7.2.	**Organizaciones No Gubernamentales**	
68	Universidad Martin Lutero	
8.	**Municipio de Waslala**	
8.1.	**Organizaciones Gubernamentales**	
69	Alcaldía Municipal	
70	Ministerio de Energía y Minas	
71	Asociación de mujer víctimas de guerra	
8.2.	**Organizaciones No Gubernamentales**	
72	Cacao Nica	
73	Cooperativa multisectorial Cafetearos orgánicos de Waslala CROWAS	
8.3	**Organizaciones Comunitarias**	
74	Asociación para la Diversificación y Desarrollo Agrícola Comunal (ADDAC)	
75	Asociación Cooperativa Waslala ACAWAS	

5 Project execution

The main executing entity of the project will be the MARENA, with the support and co-execution of the sectoral pubic institutions INTA, INAFOR; MEFCCA and INETER, as in the matrix below for some of the outputs and activities that involve critical governmental functions. Others specific field execution activities will be implemented through specific trust fund mechanisms, as also through co-executing arrangements to partner institutions like the FAO, CIAT, UNIDO, the WRI or UN-Environment

BIOCLIMA - PROJECT EXECUTION	EXECUTING ENTITIES	CO-EXECUTION OR SERVICE PROVIDER
COMPONENT 1: CONSERVING AND PRODUCING FOR LIFE		
Subcomponent 1.1 Land use management planning for landscape restoration and forest conservation		
Outcome 1.1.1 Land use management plans formulated and agreed upon	MARENA (Executing Entity), with the participation of INAFOR, INTA, MEFFCA and INETER	Specialized technical assistance and legal facilitation service providers selected through a competitive national bidding process
Subcomponent 1.2 Productive investments in landscape restoration, forest conservation and climate resilient productive systems		
Outcome 1.2.1 Degraded pastures and land restored	INTERINSTITUTIONAL TECHNICAL COMITEE (that governs the Trust Fund)	FIDUCIARY ENTITY procures the provision of technical services, goods and other inputs needed to achieve outputs
Outcome 1.2.2 Natural forests sustainably used, conserved and restored	REGULATORY COMITTEES OF THE NATIONAL FOREST FUND (FONADEFO) AND THE REDD+ RBP TRUST FUND	Competitive Fund of FONADEFO (or other Environmental Fund to be established); and Fiduciary Entity of the REDD+ RBP Trust Fund
Outcome 1.2.3 Producer organizations and communities have access to high value markets	MARENA (Executing Entity), with the participation of INAFOR, INTA, MEFFCA and INETER	FAO-Nicaragua / UNIDO, others
COMPONENT 2: GOOD GOVERNANCE		
Outcome 2.1 Regional and local (GTIs) environmental authorities of the Caribbean Region strenghened	MARENA - INAFOR (at regional level), SERENA (RACCN / RACCS), GTIs through higher budgets assigned by the MHCP	
Outcome 2.2 Public policies, instruments and tools updated and strenghtened	MARENA - INAFOR (Regional Levels), SERENA (RACCN/RACCS), GTIs	FAO NICARAGUA
Outcome 2.3 Dialogue mechanisms and roundtables strenghened	MARENA, with participation of INAFOR and MEFCCA	SDCC in support of Regional Governments and Indigenous Territory Governments
Outcome 2.4 Capacities of local organizations and territorial governmetns strenghtened	INTERINSTITUTIONAL TECHNICAL COMITEE (that governs the Trust Fund)	FIDUCIARY ENTITY procures the provision of technical services, goods and other inputs needed to achieve outputs
Outcome 2.5 Forest use and land use change control systems strengthened	MARENA, with participation of INAFOR and MEFCCA	Regional Governments and Indigenous Territory Governments
COMPONENT 3: ADAPTIVE CAPACITY DEVELOPMENT		
Subcomponent 3.1 Capacity development		
Outcome 3.1.1 Capacities of technical, extension and promotion personell strenghtened	MARENA, with the participation of INAFOR, INTA, MEFFCA and INETER	FAO NICARAGUA
Outcome 3.1.2 Capacities of producers strenghtened	INTERINSTITUTIONAL TECHNICAL COMITEE (that governs the Trust Fund)	FIDUCIARY ENTITY procures the provision of technical services, goods and other inputs needed to achieve outputs
Subcomponent 3.2 Development of tools and instruments		
Outcome 3.2.1 Information systems to support climate resilient development, landscape restoration and forest conservation operative	MARENA, with the participation of INAFOR, INTA, MEFFCA and INETER	FAO Nicaragua, CIAT, WRI, UN-Environment and other co-executing partners to be further identified
Subcomponent 3.3 Public awareness and education		
Outcome 3.2.1 The public is more aware of climate change adaptation/mitigation and forest ecosystem restoration and conservation	MARENA, with the participation of INAFOR, INTA, MEFFCA and INETER	Ministry of Education and Governments of the Caribbean Coast
COMPONENT 4. PROJECT MANAGEMENT		
Outcome 4.1 Project implementation unit operative *Outcome 4.2 Project monitoring and evaluation*	PROJECT STEERING COMITTEE (MHCP, MARENA, INAFOR, INTA, INETER, SDCC, otros; FAO Technical Secretariat)	Project Implementation Unit at MARENA (PIU)
Act. 4.2.2 Project implementation support and supervision	CABEI as GCF accredited implementing entity	BCIE / FAO-Investment Centre

5.1 The Trust Funds

The bigger part of the investment of Component 1 will be executed through trust funds and other which guarantee efficient and transparent implementation of field activities and disbursements, in accordance with the Law No. 741 on Trust Fund Contracts and its regulations. Through specific trust fund contracts to be signed between MARENA the private financial institutions these will be entrusted to manage the resources and will be instructed to carry out the specific tasks and to procure goods and services needed to produce project outputs in an efficient and transparent way. The fiduciary financing institution will be accountable to inter-institutional Technical Committees which will govern and oversee the respective trust funds.

Specific sivopastural and cocoa-agroforestry Restoration Trust Funds for will be set up to implement all activities needed to produce outcomes 1.2.1, 2.4 and 3.1.2. On the other hand REDD+ Result Based Payments from the FCPF will be channeled directly to indigenous communities that undertake Sustainable Community Projects (SCPs) as also the regional institutions through another specificRBP Trust Fund, that is being set up to this purpose according to the benefit distribution plan of the ERP.

5.2 The National Forest Development Fund FONADEFO

Project Output 1.2.2 oriented to promote sustainable forest management and conservation through Community Forest Management and Restoration (CFMR) projects to be financed by Bio-CLIMA shall be administered by the National Forest Development Fund (FONADEFO) which has been operative since it has been created by the Forest Law (No. 462) in 2003 and is a decentralized and de-concentrated institution.

Its objective is to promote the development of the forestry sector providing finance to sustainable forestry development project, afforestation in different modalities and sectoral innovaton. FONADEFO is governed by a three member Committee (“Comite Regulador”) presided by INAFOR, with the participation of MHCP and MARENA.

Between 2006 and 2016 FOANDEFO has approved and financed 61 sustainable forest development projects valued USD 1.75 million targeting approximately 62 thousand beneficiaries of which 53% have been women. The average project size was 51 ha which signals that the Fund benefits mainly small and medium land owners and communities.

The Sustainable Community Enterprises will be co-financed both, by the Result-Based-Payments Trust Fund that is being set up by MARENA and later by the National Environmental Fund created by the Law of the Environment and Natural Resources (Law 271/2008), which will also be supported by the Bio-CLIMA Project.

5.3 Strategic alignment of the ERP and Bio-CLIMA to implement REDD+

The following matrix shows how the interventions of Nicaraguas´Emissions Reduction Programme presented to the Forest Carbon Partnership Facility hosted by the World Bank and Bio-CLIMAs´are in full alignment with the objective to implement the National REDD+ Strategy:

ER Program interventions	Bio-CLIMA Components, sub-components and activities
Strategic Line 1. Forest Conservation and Strategic Line 2. Sustainable intensified production systems	**COMPONENT 1: CONSERVING AND PRODUCING FOR LIFE**
	Subcomponent 1.1 Land use and management planning for landscape restoration, forest conservation and climate-resilient production systems
	Act. 1.1.1.1 Support small producers (<50 ha) to formulate Land Use-Management Plans with business plans (LUMP-b)
	Act. 1.1.1.2 Support indigenous communities to formulate Territorial Development, Land Use and Plans (TDP), incl. business plans for Sustainable Community Enterprises (SCEs)
	Act. 1.1.1.3 Support middle sized producers (> 50ha) to formulate LUMPs, incl. business plans
	Act. 1.1.1.4 Facilitate celebration and formalize of landscape restoration and forest conservation agreements between MARENA, GTIs and beneficiaries
	Sub-component 1.2 Productive investments in landscape restoration, forest conservation and climate-resilient production systems
	Output 1.2.1 Degraded pasture- and rangeland restored
Intervention 2a: Silvopastoral trusts	Act. 1.2.1.1 Incentivize the restoration of degraded pasture land into climate resilient biodiverse silvopastural systems by small producers (< 50 ha)
	Act. 1.2.1.2 Incentivize the transformation of degraded pastureland into biodiverse silvopastures by middle to big-sized producers (>50 ha)
Intervention 2b: Agroforestry trusts	Act. 1.2.1.3 Incentivize degraded pastureland/rangeland restoration into biodiverse cocoa agroforests by small producers (< 50 ha)
Intervention 1c. Promotion of natural regeneration and social reforestation crusade	Act. 1.2.1.4 Incentivize degraded land restoration through natural regeneration on slopes above 50% into biodiverse, close to nature planted forests
Intervention 1b: Community forest management (CFM)	Output 1.2.2 Natural forest conserved and sustainably used
	Act. 1.2.2.1 Incentivize the conservation and sustainable (non timber) use of natural forest through TDPs and SCEs in (8) indigenous territories (BOSAWAS core area, Zone 3)
Intervention 1c: Promotion of commercial reforestation	Act. 1.2.2.2 Incentivize sustainable forest management and commercial timber harvesting of natural forest of (5) indigenous territories (Waspam Zone 4)
	Act. 1.2.2.3 Incentivize (through LUMP agreements) the conservation of natural forest outside indigenous territories in BOSAWAS core zone and buffer (Zones 2 and 3)
Strategic Line 4. Institutional enabling conditions	**COMPONENT 2: GOOD GOVERNANCE**
	Output 2.1 Regional and local environmental authorities and indigenous territory governments (GTIs) strengthened
Intervention 4b: Strengthen local and regional forest and land use monitoring	Act. 2.1.1 Hire new technical, extension and control personnel to work in the project area and indigenous territories
	Act. 2.1.2 Procure material, equipment and vehicles for local institutions
	Act. 2.1.3 Grant permanent budget requirements for logistics, travel, operative expenses and miscellaneous to regional, local environmental authorities and GTIs
	Output 2.2 Legal and normative framework up-dated

ER Program interventions	Bio-CLIMA Components, sub-components and activities
Intervention 4a. Harmonization of policies and coordination institutional	Act. 2.2.1 Support analysis and up-dating of forestry, environment and land-use legal and normative framework (national level)
Intervention 4d. Improved application of policies, laws, regulations and norms	Act. 2.2.2 Support regional / local environmental authorities to actualize the normative framework
	Act. 2.2.3 Support MARENA participatory up-dating of BOSAWAS and Indio Maíz management plans
Intervention 4a. Harmonization of policies and coordination institutional	*Output 2.3 Dialogue mechanisms strengthened*
	Act. 2.3.1 Strengthen sectoral public-private dialogue at regional and local level
	Act. 2.3.2 Strengthen regional/local planning and coordination of Production, Consumption and Marketing System (SPCC)
Intervention 1a: Improved forest and land use management and governance in ITGs	*Output 2.4 Territorial governments and local organizations strengthened*
	Act. 2.4.1 Strengthen the indigenous territorial governments (GTIs) in the Caribbean Region
Intervention 3a: Strengthening investment promotion by private or government institutions that promote private investments	Act. 2.4.2 Support the creation and strengthening of local producer organizations, cooperatives and community enterprises
	Act. 2.4.3 Provide legal support to officially formalize producer organizations, cooperatives and community enterprises
Intervention 4e: Increase institutional resources and capacities for forestry and land use management	*Output 2.5 Forest use, land-use change control and environmental law enforcement systems strengthened*
	Act. 2.5.1 Support the operation of timber tracking and control system (mobile units and fixed posts)
	Act. 2.5.2 Support the operation of deforestation control and forest fire prevention brigades
Intervention 4b: Strengthen local and regional forest and land use monitoring	Act. 2.5.3 Support GTIs and indigenous communities for territorial defense and control (community brigades)
Strategic Line 4. Institutional enabling conditions	**COMPONENT 3: CAPACITY DEVELOPMENT FOR CLIMATE CHANGE ADAPTATION, MITIGATION AND RESTORATION OF DEGRADED LANDSCAPES**
	Subcomponent 3.1 Capacity development
Intervention 4e: Increase institutional resources and capacities for forestry and land use management	*Output 3.1.1 Capacities of technical personnel, extension workers and promotors strengthened*
	Act. 3.1.1.1 Train technicians and extensionists in participatory land use planning instruments (LUMP-n, TDPs) for landscape restoration and forest conservation
	Act. 3.1.1.2 Train stakeholders to use the sectoral legal and normative framework
	Act. 3.1.1.3 Train technicians and extensionists to implement Bio-CLIMAs Productive Landscape Restoration / Conservation Models
Intervention 3a: Strengthening investment promotion by private or government institutions that promote private investments	*Output 3.1.2 Producers capacities strengthened*
	Act. 3.1.2.1 Provide organizational, management, financial and marketing training to members of cooperatives and producer organizations
	Act. 3.1.2.2 Train producers in LUMP and Productive Landscape Restoration Models through Farmer Field Schools
Strategic Line 4. Institutional enabling conditions Intervention 4b: Strengthen local and regional forest and land use monitoring	*Subcomponent 3.2 Tools and instrument development*
	Output 3.2.1 Information systems for climate smart sustainable development, landscape restoration and forest conservation
	Act. 3.2.1.1 Set up /strengthen a deforestation and forest fires early-warning system

ER Program interventions	Bio-CLIMA Components, sub-components and activities
Intervention 4c. Improve gathering, use and dissemination of information	Act. 3.2.1.2 Modernize and expand the tracking system for forest products
	Act. 3.2.1.3 Support monitoring of land use and land use change, deforestation and land/forest degradation
	Act. 3.2.1.4 Install and monitor permanent plots within the National Forest Inventory
	Act. 3.2.1.5 Monitor biodiversity indicator species in 10% of plots of the National Forest Inventory
	Act. 3.2.1.6 Monitor CC adaptation/mitigation and biodiversity impact of implementation of land use planning tools and productive landscape restoration and forest conservation models
	Act. 3.2.1.7 Monitor climate, hydro meteorological and pest risk phenomena, inform and emit alerts
	Subcomponent 3.3 Development of public awareness
	Output 3.2.1 The Public is more aware of the need for climate change adaptation, mitigation, landscape restoration and forest conservation
	Act. 3.3.3.1 Develop and roll-out a public communication strategy
	Act. 3.3.3.2 Undertake environmental education in local schools and communities
	COMPONENT 4. PROJECT MANAGEMENT
	Output 4.1 Project Management Unit (PMU) in operation
	Act. 4.1.1 Set-up and operate the PMU
	Act. 4.1.1 Strengthen MEFCCA/MARENA project oversight and steering capacities
	Output 4.2 Project M&E and reporting system implemented
	Act. 4.2.1 Set-up the project monitoring, evaluation and reporting system
	Act. 4.2.2 Systematize findings and lessons learnt and communicate project results
	Act. 4.2.3 Supervise and evaluate project implementation

5.4 Other strategic partnerships

The Government of Nicaragua has decided to focus its forest conservation efforts and those of all it partners in the Caribbean Region: these partnerships involve not only the emissions reductions agreement (ERPA) to be signed with the FCPF managed by the Word Bank, but involves also a diversity of development partners like the FAO, UN-Environment, the World Resources Institute (WRI), UNIDO, CIAT and others. Their specific experience in Nicaragua and the CR is described below. During the Project Inception Workshop specific roles and responsibilities of these co-executing partners will be agreed upon and co-execution agreements signed with the MARENA.

5.4.1 FAO

FAO established its Country Office in Nicaragua in 1981. Currently it´s Country Program Framework 2018-2021 includes partnerships with over 13 government institutions involved in productive, social, environmental and economic policies. Additionally FAO-NI has past and present experience working with Indigenous Territorial Governments (GTI), local organizations, producer's organizations, national and local universities, women´s organizations, among others.

Regarding BIOCLIMA´s results, FAONI specific experience and comparative advantage is the following

a.) Capacity Building (CB): conducting on the ground diagnostic of capacity gaps, formulating CB plans with different modalities that go from academic post degree to short term trainings both face to face and using e-learning platforms. In these processes, FAO has resorted to South-South cooperation

partners, and it has customized to a national context different training tools and methodologies. Some subjects for CP have been farm planning, forest community management, cross-cutting gender approaches, and climate smart agriculture.

b) National Implementation of Information Systems: Globally FAO has devolved tools and software mostly based on open source, remote sensing, satellite images and especially user-friendly interface. Some of these are open foris, sepal, ASIS, MOSAICC, Ex-act, among others. Specifically FAONI provided TA to the planning and implementation of the First Forest National Inventory (FNI) back in 2008, and is now promoting the Voluntary Guidelines for National Forest Monitoring, which is a framework for the upcoming 2nd FNI. FAO also counts with an Information Technology Division (CIO) and technical divisions that work together to design, develop and promote specialized tools for projects.

c) Project execution: FAO-NI has designed and implemented over 100 projects to support National Public Policy implementation in its field of mandate, an has generated national experience under a Results Based Management (RBS) approach. FAO counts with an Office for Evaluation (OED) that conducts yearly internal and external evaluations both for intermediate and final periods.

5.4.2 CIAT

CIAT is an international agricultural research institution that collaborates with partners to help developing countries make farming more competitive, profitable and resilient through sustainable resource management. Founded in 1967 with headquarters in Colombia, CIAT today is a global organization with ongoing research in over 70 countries in Africa, Asia and Latin America. Core institutional strengths include climate-smart agriculture, enhancement of ecosystem services, conservation and use of plant genetic resources, crop breeding, bio-fortification, linking farmers to markets, soil fertility management, land restoration, and big data analysis. CIAT is a member of the CGIAR System Organization, actively collaborating with a global network of 15 research centers. CIAT leads the CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS) which represents an annual portfolio of over U$50 million in research for development investments with over 100 partners globally focused on supporting farmers, governments and the private sector in meeting global climate change commitments. CIAT is also lead center for research on forages and sustainable livestock, soils and landscape restoration within the CGIAR.

CIAT's Central America regional team consists of 27 researchers and support staff covering a wide range of disciplinary expertise in climate change adaptation and mitigation, socio-economics and policy, agroecology and farming systems, and ecosystem services and landscape restoration. CIAT has supported countries in the region in defining, achieving and reporting their climate commitments including NAMAs, adaptation planning, MRV, climate services and climate change scenarios and impacts for specific sectors and regions. CIAT has had an office in Nicaragua since the 1990s with 14 staff based there currently. CIAT has a long history of fruitful collaboration with public institutions in Nicaragua including INTA, MAG, MEFCCA and MARENA, among others, in topics related to climate change, landscape restoration, crop breeding, livestock, water resources, big data and nutrition.

5.4.3 UNIDO

The United Nations Industrial Development Organization (UNIDO) has accompanied Nicaragua in strengthening the cocoa value chain for more than 10 years in the North Caribbean Coast. During this time has worked in complementation with public institutions such as MEFCCA, INTA, IPSA, Caribbean

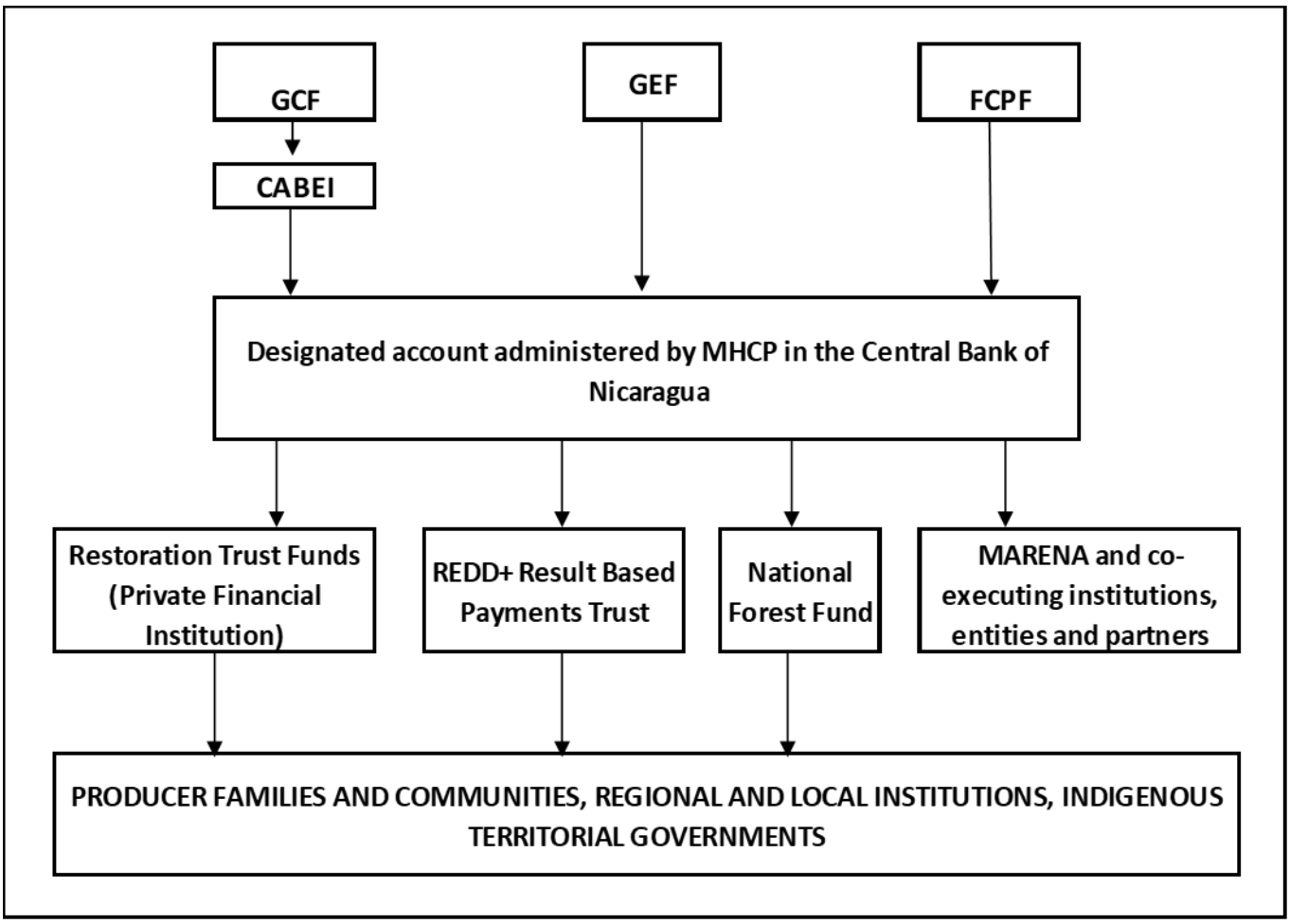
Coast Development Secretariat (SDCC), cooperation agencies, producers, cooperatives, processing industries, service and commerce companies.

During 2009-2011, UNIDO implemented two technical assistance projects that established 430 hectares of cocoa in agroforestry systems in the North Caribbean Coast, the construction of four collection centers and the incorporation of 395 families organized in 36 business networks with their promoters.

Since 2014 to now, UNIDO has accompanied the strengthening of cooperatives in the mining triangle, always in complementation with various public and private actors. Management and organizational capacities have been developed, strengthening productivity and quality. Likewise, quality certification processes and access to high-value cocoa markets were introduced. By 2015 the cooperatives in the area were already selling 40 tons of cocoa, in 2018 they reached 160 tons and by 2019 the estimates are 240 tons. To date, about 95% of the sold cocoa is certified.

5.5 Financial management and disbursement arrangements

The MHCP will have the overall oversight of the financial execution of the Project and will set up a special designated dollar account in the Central Bank of Nicaragua to which all the financial resources for the Bio-CLIMA Project will be deposited. From there it will transfer the financial resources to the different executing and co-executing entities for project implementation, as shown in the fund flow chart below



[1] Agriculture contributes 17% to Nicaragua´s GDP and represents more than 70% of the countrys´ total exports.
[2] Niveles de Referencia de las Emisiones Forestales. MARENA 2019.
[3] TechnoServe, 2017. In ER-PD in preparation, ibid.
[4] Includes six Natural Reserve Areas (Bosawas, Cerro Kilambe, Cola Blanca, Banacruz, Macizo de Peñas Blancas y Pis Pis) and the National Park "Cerro Saslaya".
[5] Incluyes: Historical monument "Fortaleza La Inmaculada Concepción", National Monument "Archipiélago de Solentiname", two Wild Life Refugees (Río San Juan y Los Guatuzos), the Biological Reserve "Indio Maíz" and three Natural Reserve Areas (Cerro Silva, Punta Gorda, Serranía de Yolaina).
[6] World Bank; CIAT. 2015. Climate-Smart Agriculture in Nicaragua. CSA Country Profiles for Africa, Asia, and Latin America and the Caribbean Series. Washington D.C.: The World Bank Group.
[7] MARENA 2018 Priorización de áreas de intervención del Proyecto BIO-CLIMA " Fortalecimiento Integral de la Resiliencia al Cambio Climático de las Zonas de Reserva de Biosfera BOSAWÁS y Río San Juan" Noviembre 2018.
[8] Caribbean Coast Emission Reduction Program Document (ER-PD) submitted to the Forest Carbon Partnership Facility FCPC. Carbon Fund. Nicaragua, May 29, 2018
[9] Niveles de Referencia de las Emisiones Forestales. MARENA 2019
[10] This section reproduces ERPD page 30 ff, and its annex 2 page 93 ff, MARENA, 2018.
[11] ERPD MARENA 2019: Based on non-adjusted estimates derived from land cover maps. The numbers thus differ slightly from the adjusted estimates for deforestation for the period 2005-2015 based on the sampling of 1309 points (see ERPD Sections 7-9).
[12] The quantity of forests in 2005 was 3,421,985 ha, based on maps of forest cover.
[13] http://www.inta.gob.ni/index.php/noticias/485-presentan-plan-de-produccion-consumo-y-comercio-2017-2018
[14] Studies carried out in 2000 and 2003 indicate that illegal logging is equivalent to 60% of the timber volumes authorized and registered by INAFOR. However, other, more recent studies by the World Bank indicate that illegal logging is in the range of 150,000 – 200,000 m^3/yr).
[15] This section reproduces the ERPD pages 22-52, based on the ENDE REDD+, MARENA 2018
[16] TechnoServe (2016). Building a Competitive and Inclusive Livestock Sector in Nicaragua USDA. Managua.
[17] Fuente: MIFIC, FMI, Trade Nosis, CETREX, AO; citados por PROGRESA, CRS USDA, 2014. Riesgos y oportunidades del sector de ganadería del doble propósito en Nicaragua.
[18] Lopez, M. (2012). Análisis de las causas de la deforestación y avance de la Frontera Agrícola en las zonas de Amortiguamiento y Zona Núcleo de la Reserva de Biósfera de BOSAWAS-RAAN. GIZ- OSFAM Managua.
[19] IICA (2014). Estudio de Factibilidad, Programa de Reconversión Competitiva de la Ganadería Bovina (PRCGB). Managua
[20] Lezama, M. (2007). El Índice de Capital Natural como instrumento de análisis de pérdida de biodiversidad en Nicaragua.

[21] Bermúdez, M, S. Flores, M. Romero, J. Bastiaensen, P. Merlet, F. Huybrechs, G. Van Hecken, y J. Ramirez (2015). POLICY BRIEF: ¿Es posible financiar la ganadería en la frontera agrícola de Nicaragua de manera sostenible? Nitlapan, UCA, Managua.
[22] SPPP (2016). Mejorando la Resiliencia y la Adaptación al Cambio Climático en Nicaragua Mediante el Desarrollo Masivo de Sistemas Agroforestales y plantaciones forestales. Managua.
[23] Tomich T.P., M. Van Noordwijk M., S. Vosti S. y J. Witcover (1998). Agricultural development with rainforest conservation: Methods for seeking best bet alternatives to slash-and-burn, with applications to Brazil and Indonesia. Agricultural Economics, 19, 159–174.
[24] Kaimowitz D. y A. Angelsen (2008).... no lo hacen hasta que ya no hay más bosques para talar. CIFOR. Bogor, Indonesia.
[25] White, D., F. Holmann, S. Fijusaka, K. Reategui, y C. Lascano (2001). Will intensifying pasture management in Latin America protect forests—or is it the other way round? In: A. Angelsen & D. Kaimowitz (eds.). Agricultural Technologies and Tropical Deforestation, pp. 91-111. Wallingford : CABI Publishing.
[26] CODEXCA, PRONicaragua, 2015. Estudio de potencialidades, barreras, estrategia de promoción de inversiones y conceptualización de proyectos de inversión en la Costa Caribe de Nicaragua.
[27] Presentation of Dr. P. Oquist, Minister, Private Secretariat for National Policies, Presidency of the Republic, Cali, Colombia, March 1, 2017.
[28] Evidence includes increased use of improved pasture seed, fertilizer purchases, establishment of specialized cattle development operations and feedlots, and increased use of credit.
[29] BID (2015) estimates a combined value of $427 – 822 million for cocoa, coconuts, robusta coffee, oil palm, and bamboo.
[30] PRONicaragua projects an additional $120 million in investments in teak, cocoa, oil palm, coconuts, and tourism for the period 2017-2019.
[31] CENAGRO (2011). Informe Final IV. Managua
[32] If yields were greater, the effective area logged would be even less.
[33] Forestry management plans are aimed principally at the planning, execution, supervision, and evaluation of activities that assure sustainable commercial timber production and involve relatively large areas of forest. Domestic permits are designed to facilitate the use of forests by community dwellers for subsistence and improvement of dwellings that entail volumes less than 10 m^3. Additionally, these permits should follow forestry management guidelines, including planting 10 trees for every one harvested. Salvage plans are aimed at ensuring adequate forest phytosanitary conditions following events, such as hurricanes, that affect large areas of forests. Prerequisites include a study of the magnitude of the damage and the feasibility of salvage by competent authorities. Finally, the objective of resin extraction permits is to produce resin from conifer forests for commercialization, based on silvicultural criteria. If the area is larger than 500 ha, an environmental impact study also needs to be carried out.

[34] See Cabera, C. and Terrero, O. (2016). Diseño de un esquema de incentivos forestales para la Región Autónoma de la Costa Caribe Norte, UICN.
[35] Cabrera, C. and O. Terrero (2016). Diseño de un esquema de incentivos forestales para la Región Autónoma de la Costa Caribe Norte, UICN.
[36] This section is based on the Assessment of Land Tenure done during the REDD+ Readiness Phase and the ERP Document http://enderedd.sinia.net.ni/Docs/Doc_PaqueteR/20.%20Analisis_de_la_Tenencia_de_la_Tierra(040717).pdf

[37] This section is based on the ERPD and specifically on its annex "Presence of third parties in communal lands of the original and Afro-descendant peoples in the area of the ER Program", MARENA, 2018.
[38] Agriculture in Nicaragua: Performance, challenges and options. World Bank, IFAD, Cooperación Suiza. November 2015.
[39] World Bank; CIAT. 2015. Climate-Smart Agriculture in Nicaragua. CSA Country Profiles for Africa, Asia, and Latin America and the Caribbean Series. Washington D.C.: The World Bank Group.
[40] Germanwatch. 2019. Global Climate Risk Index 2019, Available online at: https://germanwatch.org/en/download/16411.pdf.
[41] Agriculture in Nicaragua: Performance, challenges and options. World Bank, IFAD, Cooperación Suiza. November 2015.
Note: The authors include in the concept of "family farming" all types of farms, only excluding the agro-industries.
[42] Atlas de Escenarios Climáticos de Nicaragua hasta el año 2080. INETER. 2017. Proyecto "Desarrollo de capacidad adaptativa para el Cambio Climático en el sector transporte". Ministerio de Transporte e Infraestructura, 2015.
[43] Gourdji S; Läderach P; Martínez Valle A; Zelaya Martínez C; Lobell D. 2015. Historical climate trends, deforestation, and maize and bean yields in Nicaragua. Agricultural and Forest Meteorology 200:270–281.
[44] Läderach P; Martínez Valle A; Castro N. 2012. Predecir el impacto del cambio climático sobre las áreas de cultivo de cacao en Nicaragua. Managua: International Center for Tropical Agriculture (CIAT).
45 Art. 182. The Constitution is the fundamental charter of the Republic and the other laws are subordinated to it. No laws, treaties, decrees, regulations, ordinances or dispositions that oppose or alter its dispositions shall have any value.

46 Law No. 854, "Law of Partial Reform of the Political Constitution of the Republic of Nicaragua," approved on January 29, 2014, published in *La Gaceta, Diario Oficial* No. 26 of February 10 of the same year.

[47] Contribución Nacionalmente Determinada a la Mitigación del Cambio Climático (NDC) de la República de Nicaragua antes la Convención Marco de Naciones Unidas sobre Cambio Climático (CMNUCC). 2018.
[48] ibid
[49] Density of weather stations in the CR and precipitation is shown in Annex 1, Figure 14
[50] Ejes del Programa Nacional de Desarrollo Humano 2018-2021. Diciembre 2017. Managua.
[51] Política Nacional de Mitigación y Adaptación al Cambio Climático. Gobierno de Reconciliación y Unidad Nacional. Managua, Nicaragua 2018.
52 Text of Law No. 217, "General Law of the Environment and Natural Resources" with its reforms incorporated, published in *La Gaceta, Diario Oficial* No. 20 of January, 31, 2014.

53 Law 462, Law of Conservation, Fostering and Sustainable Development of the Forestry Sector, approved on June 26, 2003, published in *La Gaceta,* Diario Oficial No. 168 of September 4, 2003.

54 Original and Afro-descendant Peoples of Nicaragua.

[55] Published in *La Gaceta* No. 16 of January 23, 2003
56 Art. 2 of Law 445.

[57] This section is based / adapted on the corresponding chapter of ERPD (ibid), MARENA, 2019
58 Law 290, Law of the Organization, Competency and Procedure of the Executive Branch.

59 Law of Partial Reform to Law No 290, Law of Organization, Competency and Procedures of the Executive Branch, to Law 462, Law of Conservation, Promotion and Sustainable Development of the Forest Sector. *La Gaceta, Diario Oficial,* No. 87 of May 11, 2017.

60 Law 311, Organizational Law of INETER. *La Gaceta*, *Diario Oficial,* No. 143 of July 28, 1999.

61 Wihtas in the Miskito language and Wistah in the Mayangna language.

[62] FUNICA, RAAN, URACCAN, 2010: Páginas amarillas de profesionales agrícolas, agroforestales, pecuarios y acrícolas de la RAAN y la RAAS.
[63] Source: Consejo Regional Autónomo del Atlántico Norte 2010. Directorio de actores sociales aliados potenciales para la implementación de la Estrategia Forestal de la RAAN.